

Climate Change:
Developing Countries

Issue

How to respond to domestic criticism of the current U.S. approach to developing countries in the climate change negotiations.

Background

- o [OES to supply para on historical/future emissions]
- o The 1992 UN Framework Convention on Climate Change (the "Convention"), in light of differing contributions to climate change and differing capacities to respond, recognizes that Parties have "common but differentiated responsibilities." Thus, while all Parties must take measures to address climate change and to report on such measures, as well as on their greenhouse gas emissions, developed countries are to "take the lead." As such, so-called "Annex I" countries (currently including OECD member states as of 1992 plus Russia/Eastern Europe) are to report with more specificity and with the non-binding "aim" of returning their emissions to their 1990 levels by the year 2000.
- o The Convention calls for periodic reviews of the adequacy of commitments. At their first meeting in 1995, the Parties concluded that the existing developed country commitment was not adequate because it did not contain any quantitative objectives beyond 2000. The resulting "Berlin Mandate" calls upon Annex I countries to agree upon quantified emissions limitation and reduction objectives; with respect to "non-Annex I" countries (hereinafter referred to as "developing countries"), it states that the process will introduce "no new commitments," but rather will "continue to advance the implementation" of Article 4.1 of the Convention (the provision containing qualitative measures for all Parties).
- o The U.S. agreed to a Mandate providing for no new developing country commitments because:
 - the Mandate left completely open the level of the Annex I commitment;
 - there was a certain legitimacy to the argument that developed countries had not yet really "taken the lead," given that only two years had passed since entry into force of the Convention and, further, that developed countries (with two exceptions) were nowhere close to meeting the non-binding "aim" in the Convention;

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- the Mandate leaves developed countries free to press for new developing country commitments in the very next round of negotiations (not, for example, until developed countries have met their next target);
 - U.S. insistence that developing countries take on new commitments in this round (a position not even supported by the EU) would have resulted in all likelihood in no negotiating process -- a result that would have been awkward for an Administration committed to making environmental progress on this issue; and
 - it was considered that the Mandate's call for the process to continue to advance implementation of Article 4.1 of the Convention provided substantial scope for elaborating important developing country elements.
- o In the Berlin Mandate process, which is scheduled to culminate in agreement in December in Kyoto, the U.S. has been seeking, as a matter of content ("what"):
 - an additional category, so-called "Annex B," which would include countries that voluntarily agree to take on binding quantitative targets; (initially, the U.S. has been focusing on Korea and Mexico, as States that joined the OECD after the Convention was adopted);
 - an elaboration of Article 4.1 of the Convention containing various qualitative requirements, including an obligation to "take actions to address climate change that are justified economically in their own right and can also help in solving other environmental problems" (so-called "no regrets" measures), as well as a more rigorous report and review process for developing countries; and
 - a so-called "evolution" provision, calling for the adoption, by 2005, of binding quantitative emissions obligations for all Parties (i.e., including developing countries) and a mechanism for automatic application of progressive obligations, based on agreed criteria; the U.S. has not specified what kind of criteria might be appropriate.
 - o In terms of placement and timing ("where" and "when"), the U.S. has been seeking, as a minimum requirement, inclusion of all of the above elements in the protocol or other legal instrument to be adopted in Kyoto in December.

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- o [OES fill in current negotiating situation -- reaction to our proposals -- complicated by fact that we don't yet have proposed U.S. target -- what we are likely to get/not get]

Domestic Concerns

- o The Senate recently voted overwhelmingly to pass the non-binding Byrd Resolution, which expresses, among other things, the view that the U.S. should only sign a new agreement that also mandates "new specific scheduled commitments to limit or reduce greenhouse gas emissions" for developing country parties "within the same compliance period" as for developed countries.
- o In addition, certain segments of industry (such as...) have made clear their view that the current U.S. approach to developing countries is not adequate.
- o Reasons for considering that our approach to developing countries is not adequate can vary from group to group or even Senator to Senator (as is clear from the floor statements regarding the Byrd Resolution).
- o Articulated reasons are essentially two:
 - Competitiveness. The concern here is that certain segments of U.S. industry could suffer commercial disadvantage if they are subject to climate change-related regulation and their competitors in developing countries are not.
 - Fairness. The concern here is that it is simply "unfair" for an agreement to subject the United States to stringent requirements while letting developing countries (in particular the larger or wealthier ones) "off the hook."
- o An unarticulated reason of some is opposition to any U.S. action on climate change and use of the developing country issue to create a "poison pill" in the negotiations.
- o Each of these underlying reasons is difficult to address:
 - Regarding competitiveness, the evidence contained in the economic literature and climate change economic analyses about international competitive impacts is quite thin. Overall impacts on the economy will be quite small -- many goods and services are not traded

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and, of those that are, many are traded primarily with other Annex I countries. On the other hand, the effect on the major energy-intensive industries is less clear; little analysis has looked at the level of energy price differentials (\$50-100/ton) that might result, but large energy price differentials internationally already exist. In any event, it is not clear that even the Byrd Resolution's call for developing country commitments within the same compliance period but which could be different from Annex I commitments would necessarily address the concern. What is clear is that relevant industries care passionately about this issue.

- o Complicating this issue is that not all those raising "competitiveness" issues are concerned with trade competitiveness; coal producers and oil companies, for example, are concerned about adverse impacts on their assets and the prices they command for the fossil fuel they produce relative to other fuels and to energy conservation.
- Regarding fairness, the counterargument that would be faced internationally is that "fairness" cuts in the other direction, namely that it is equitable to ask the U.S., which contributes X% of global emissions, has a per capita energy consumption rate X times greater than..., and is highly developed, to take on a target commitment before asking less developed countries to do so. Nonetheless, the fairness concern has resonance among the U.S. public.
- Concerning the unspoken reason ("poison pill"), even the most forthcoming developing country package would not satisfy this concern; indeed, once the Administration had achieved a particular package, the "moving target" would move again.
- o Further complicating the issue is the fact that, while the Byrd Resolution makes clear what kind of an agreement would not be acceptable, it does not indicate what would be acceptable.
- o (It should be noted that, while there may be good environmental reasons why the large-emitting developing countries should be committed to targets in this round, critics have not focused on these.)

Basic Scenarios

- o From both an environmental and political point of view, it is assumed that the optimum scenario is one that results in an agreement that can be ratified by the United States.
- o It is easy to sketch out the scenarios at either end of the spectrum, namely scenarios that result either in no agreement (with the U.S. blamed for "killing" the agreement) or an agreement that could not be ratified by the U.S. (at least not now):
 - At one end, the U.S. agrees to a target with substantial economic implications, seeks no further developing country commitments, and does not address domestic competitiveness/fairness concerns (either by rebutting or accommodating).
 - At the other end, the U.S. insists that key developing countries, including China, take on the Annex 1 target in the December agreement.
- o It is more difficult to develop scenarios that walk the line between domestic unacceptability and international unacceptability.
- o Middle scenarios might involve:
 - Staying the course internationally and addressing competitiveness issues, to the extent they exist, through a domestic mechanism, e.g., a border tax solution for the dozen most energy intensive goods, compensation to affected industry, import relief if U.S. imports rise too quickly in a short period).
 - Addressing concerns through the U.S. target, namely minimizing competitiveness and fairness concerns by adopting a very modest U.S. target (e.g., one that implies a permit price of about \$X/ton).
 - Seeking additional developing country commitments that are within the realm of the achievable.
 - A combination of the above.
- o A further consideration in determining whether a particular agreement would be ratifiable by the U.S. is whether the Administration should be seeking an agreement that is acceptable to the current Senate or some future Senate.

Developing Country Commitments"Whether"

- o In deciding whether all or part of the U.S. response to domestic concerns should be to seek additional developing country commitments, decisionmakers should take into account the following:
 - Additional commitments will be difficult to achieve. In addition to the "equity" arguments above:
 - o Many developing countries (and indeed some developed Parties, such as the EU) already view the existing U.S. proposals as unacceptable and, in part, as exceeding the Berlin Mandate.
 - o Many will view a new U.S. demand as an attempt by one country to dictate the terms of the agreement, a country which is overwhelmingly the largest contributor to greenhouse gas emissions and which has not even come forward with its own proposed target.
 - o The U.S. does not have particular leverage vis-a-vis developing countries in this negotiation. Unlike the usual negotiation, where obligations are reciprocally sought, many developing countries are indifferent (or even hostile) to our agreeing to take on a target.
 - Seeking substantial additional commitments, particularly ones exceeding the Berlin Mandate, could be viewed by some as a means of ensuring that the negotiations do not succeed, thereby appearing to undercut professed U.S. interest in addressing the climate change problem.
 - A U.S. demand for further commitments would likely trigger counterdemands for a more stringent target commitment from developed countries, including the United States.
 - A U.S. demand for further commitments, even if accepted by developing countries, would undoubtedly also trigger counterdemands for more funding. We would not likely be in a position to agree to more funding, given the two-thirds reduction in U.S. contributions to the Global Environment Facility (the financial mechanism for the Convention).

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- Seeking additional commitments may also be criticized by environmental NGOs as the Administration's caving in to industry groups rather than taking them on.

"Who"

- o In terms of additional commitments that might be sought, it is critical to determine which countries we are concerned about. While the Byrd Resolution technically seeks commitments from all developing countries for the same compliance period as Annex I countries, it is likely that inclusion of certain key countries would go a long way toward mitigating domestic concerns (and also be easier to negotiate).
- o It appears that the countries that matter most from a domestic political point of view are the ones that have reached a certain level of economic development and those that will be large emitters. This would argue for the inclusion of:
 - all OECD member States (which would mean the inclusion of Korea and Mexico today and whoever else joined in the future);
 - rapidly industrializing countries (such as Malaysia and Argentina); and
 - China and possibly India.
- o Triggers might be: GDP, per capita income, or share of global emissions.

"What"

- o Another issue is what would be asked of countries in terms of commitments.
- o Options are grouped into targets, policies/measures, and incentives:
- o In terms of targets, options could include:
 - requiring the same target as Annex 1 countries;
 - requiring a quantitative target, but the target could be less stringent (in terms of percentage/timing) than that of Annex 1 countries and could vary depending upon the country;
 - o a target could involve a percentage of a past baseyear, a limitation on the rate of future emissions growth, or a formula that adjusts the target automatically to the country's economic growth rate;

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- requiring a non-legally binding "aim;"
 - requiring agreement on a date certain when targets would have to be taken on (e.g., with common targets but differentiated timetables);
 - setting up the Annex 1 target so that it is contingent (either in its entirety or for the second budget period) upon quantitative commitments' being taken on by all or certain developing countries by X date;
- o In terms of policies and measures, options might include:
 - requiring certain policies/measures to reduce emissions (e.g., elimination of fossil fuel subsidies; removal of obstacles to alternative fuels);
 - requiring common, legally binding performance standards (e.g., for all sources in industries that are both energy-intensive and capable of relocating or on certain utility and industrial equipment);
 - requiring an even more rigorous reporting and review process than we are currently seeking in our Article 4.1 proposal;
 - o In terms of incentives (which, in general, would not affirmatively require developing country commitments), options could include:
 - only allowing JI with countries that have quantitative targets;
 - agreeing among OECD countries that a precondition for membership is taking on the Annex 1 commitment;
 - agreeing among OECD countries that export financing/insurance will be limited, based on climate change-friendly projects or other conditions;
 - agreeing that IFI and bilateral assistance is to be made conditional upon adoption by recipients of "suitable quantitative commitments or other conditions (e.g., "cleanliness" of project);
 - development of a longer-term technology/export strategy designed to make future infrastructure of developing countries climate-friendly;

-- [other].

"Where/When"

- o In terms of "where/when," the U.S. does not necessarily need to seek all developing country-related elements in the Kyoto agreement itself:
 - An advantage of seeking "new" developing country commitments outside the Kyoto agreement is that, technically speaking, the Berlin Mandate would not be exceeded.
 - It is also critical to note that any U.S. proposal to include something in the Kyoto agreement that goes materially beyond existing proposals would be vulnerable to the charge that it violates the Convention's six-month rule, namely that notice of a proposed protocol/amendment must be given six months before its adoption. (Note that this would not necessarily be an issue if adoption of the agreement took place later than December.)
 - As noted above, a commitment to future negotiations (such as our current "evolution" proposal) could take the form of a decision of the Parties in Kyoto rather than be in the agreement itself.
 - Further, the U.S. could agree to adoption of a less-than-complete Kyoto agreement in December and make clear that it will not sign [note: the Byrd Resolution says don't "sign," not don't "adopt"] the agreement or transmit it to the Senate until a number of other elements are in place.
 - Outside-Kyoto elements might include, for example:
 - o getting key countries to take on the Annex 1 target by joining Annex 1 under the Convention (through the Convention's "review of annexes" procedure, to begin at COP 3 and finish at COP 4) rather than including them in the Kyoto agreement;
 - o amending the Convention to add an Annex B, rather than including an Annex B in the Kyoto agreement;
 - o including an Annex B in the Kyoto agreement, but getting key countries to take on an Annex B target after the Kyoto agreement is adopted;

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- o seeking quantitative targets or other commitments from key countries through bilateral agreements with the U.S.;
 - o seeking quantitative targets or other commitments from key countries through regional groups (e.g., the Japanese proposal for a pledge and review process under APEC auspices;
 - o elaborating certain processes under the Convention (such as related to developing country reporting and review); these would then apply to all Parties to the Convention, not just Parties to the Kyoto agreement;
 - o taking up elements relating to the OECD and IFIs within those fora;
 - o [other].
- o If certain key elements are to be sought outside the Kyoto agreement and if the Kyoto agreement is to be adopted in December, before the other elements are in place, it needs to be decided what is the minimum that must emerge from Kyoto to be politically acceptable (e.g., it might not be viable to include only a developed country target in the agreement and seek all other elements elsewhere).
 - o Alternatively, the U.S. might seek to postpone the adoption of any Kyoto agreement until COP 4 in 1998, at which point certain other elements could be available, such as the addition of new countries to Annex 1 and the amendment of the Convention to include a new "Annex B." The Kyoto agreement and the new elements could be combined into one amendment package or legally linked in some other way.
 - o [Note that it is not just developing country elements of the U.S. position that could be deferred past Kyoto. For example, regarding JI with credit, some argue that the decision whether to allow JI with credit should only be made after the pilot phase is over; the Kyoto agreement could provide that Parties with targets can use JI, "in accordance with the decision taken the Parties to the Convention in [date]." The U.S. could make clear that a decision to allow JI with credit is a precondition for our joining the Kyoto agreement.]

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Next Steps

- o Time is of the essence with respect to any option that requires international negotiation.
- o If it is also decided to seek additional developing country elements outside (and later than) the Kyoto agreement:
 - it would be advisable to reach out to domestic constituencies to start changing expectations about what is to emerge from Kyoto itself; and
 - it will be necessary to figure out the means for achieving the post-Kyoto objectives.

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY

WASHINGTON, D.C. 20502

Policy

September 16, 1997

SEP 16 PM 3:49

MEMORANDUM FOR

TODD STERN
KATIE McGINTY
GENE SPERLING
DAN TARULLO

FROM: ROSINA M. BIERBAUM

RE: FYI

cc: TJ Glauthier
Peter Orszag
David Sandalow
Janet Yellen

Attached, please find a memo I received from the Staff
Director of the joint NAS/NAE/IOM report, "Policy Implications of
Greenhouse Warming..."

Note: potential for a 25% reduction of US greenhouse gases at
less than \$10/T.

Call me at 6-6077, if you have any questions.

German-American Academic Council Foundation
Stiftung Deutsch-Amerikanisches Akademisches Konzil
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8 October, 1996

MEMORANDUM

Via Fax: 202-456-6025
Two Pages Total

To: Rosina Bierbaum, OSTP
From: Rob Coppock, Deputy Director **RL**
Subject: Greenhouse gas emissions reduction potential

The NAS report "Policy Implications of Greenhouse Warming: Mitigation, Adaptation and the Science Base" states on p. 493:

"[A review of Figures 29.2 to 29.5 indicates that] it would not be unreasonable to expect that a roughly 25 percent reduction in U.S. greenhouse gas emissions (i.e., 2 Gt CO₂ equivalent) might be achieved at a cost of less than \$10/t CO₂ equivalent. This is, in more commonly used terms, roughly an additional \$22 per short ton of coal, \$4.75 per barrel of oil, \$0.60 per million cubic feet of natural gas, \$0.11 per gallon of gasoline, or 0.7 cents /kWh for the current U.S. electricity mix."

These costs were estimated using available technologies in a variety of sectors (residential and commercial energy management, industrial energy management, transportation, electricity and fuel supply, and nonenergy emissions reductions).

Cheryl M. Carter

09/08/97

01:34:09 PM

Record Type: Record

To: Shelley N. Fidler/CEQ/EOP, William J. Antholis/OPD/EOP, Peter O'Keefe/WHO/EOP, Beth A. Viola/CEQ/EOP

cc: Maria Echaveste/WHO/EOP, Mark Hunker/WHO/EOP

Subject: proposed agenda for Sept. 11

Proposed agenda for Thursday, September 11 briefing follows:

2:00 pm Welcome
Maria Echaveste

2:05 - 2:20 pm "Why Climate Change is important to The President." and Q&A
Todd Stern

2:20 - 3:00 pm Science presentation and Q&A
TBD (Gibbons or Carl)

3:00 - 3:30 pm Impacts and Q&A
James Lee Witt

3:30 - 3:45 pm Break

3:45 - 4:15 pm Solutions & Q&A
Katie McGinty

4:15 - 5:00 pm Vice President's presentation

List of potential speakers on Climate Change from the Administration:

Marie Echaveste

Todd Stern

Jack Gibbons

Katie McGinty

Gene Sperling

Dan Turullo

VP

Cabinet -- Rubin/Daley/Pena/Browner/Babbitt/Witt

Janet Yellen

Tim Worth

Stu Eizenstat

Sandy Berger/Jim Steinberg - NSC

Dirk Forrester

Betsy Moeller - DOT

Fred Hanson - DOT

Garamendi - DOT

OP L
Op'n
Lester
Dmy

Policy

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POLICY IMPLICATIONS OF GREENHOUSE WARMING

Policy Implications of Greenhouse Warming—Synthesis Panel

Committee on Science, Engineering, and Public Policy

**National Academy of Sciences
National Academy of Engineering
Institute of Medicine**

**NATIONAL ACADEMY PRESS
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NOTICE: The project that is the subject of this report was approved by the Governing Board of the National Research Council (NRC), whose members are drawn from the councils of the National Academy of Sciences, the National Academy of Engineering, and the Institute of Medicine. The members of the panel responsible for this report were chosen for their special competences and with regard for appropriate balance. This report is the result of work done by an independent panel appointed by the Committee on Science, Engineering, and Public Policy, which has authorized its release to the public.

This report has been reviewed by a group other than the authors according to procedures approved by a Report Review Committee and by the Committee on Science, Engineering, and Public Policy. Both consist of members of the National Academy of Sciences, National Academy of Engineering, and Institute of Medicine.

The study reported here was supported by the U.S. Environmental Protection Agency. It also received support from the National Research Council Fund, a pool of private, discretionary, nonfederal funds that is used to support a program of Academy studies of national issues in which science and technology figure significantly. The NRC Fund consists of contributions from a consortium of private foundations including the Carnegie Corporation of New York, the Charles B. Culpeper Foundation, the William and Flora Hewlett Foundation, the John D. and Catherine T. MacArthur Foundation, the Andrew W. Mellon Foundation, the Rockefeller Foundation, and the Alfred P. Sloan Foundation; and the Academy Industry Program, which seeks annual contributions from companies that are concerned with the health of U.S. science and technology and with public policy issues with technological content.

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**POLICY IMPLICATIONS OF GREENHOUSE WARMING—
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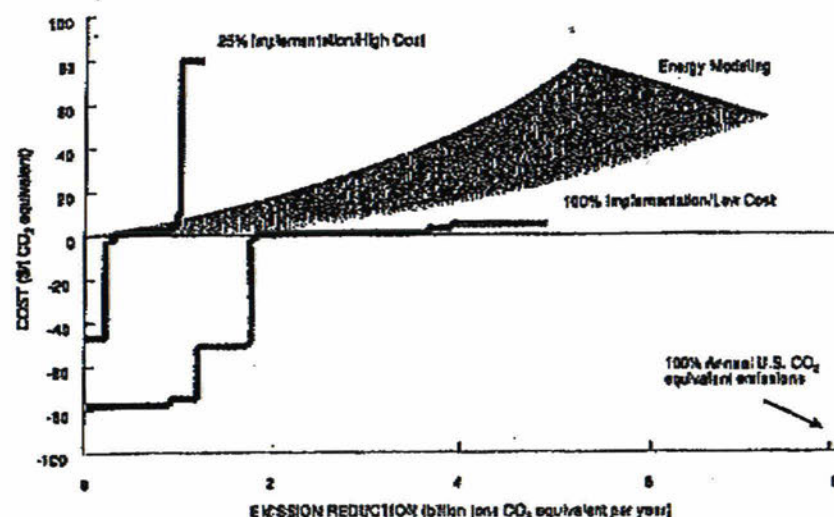


FIGURE 6.4 Comparison of mitigation options using technological costing and energy modeling calculations.

SOURCE: Chapter 11 of the report of the Mitigation Panel.

"100% Implementation/Low Cost" assumes complete implementation of each option (100 percent implementation) combined with the low range of cost estimates for that option (low cost). This line indicates the upper bound that could be achieved with all options shown. A complete analysis would calculate appropriate implementation rates for each option. That is beyond the scope of this study. It should be realistic to achieve emission reduction and cost results somewhere between the two lines in Figure 6.3.

As pointed out earlier in this chapter, technological costing and energy modeling sometimes yield different results. For this reason, both are presented in Figure 6.4. The "100% Implementation/Low Cost" and "25% Implementation/High Cost" curves are repeated from Figure 6.3, and the range typical of energy modeling is shown. As can be seen from Figure 6.4, the United States should be able to achieve substantial reduction in greenhouse gas emissions at low cost, or perhaps even a small net savings.

IMPLEMENTING MITIGATION OPTIONS

An array of policy instruments of two different types are available: regulation and incentives. Regulatory instruments mandate action and include controls on consumption (bans, quotas, required product attributes), produc-

tion (quotas on products or substances), and factors in design or production (efficiency, durability, processes). Incentive instruments are designed to influence decisions by individuals and organizations and include taxes and subsidies on production factors (carbon tax, fuel tax) and on products and other outputs (emission taxes, product taxes), financial inducements (tax credits, subsidies), and transferable emission rights (tradable emission reductions, tradable credits).

Interventions at all levels could effectively reduce greenhouse warming. For example, individuals could reduce energy consumption, recycle goods, and reduce consumption of deleterious materials. Local governments could control emissions from buildings, transport fleets, waste processing plants, and landfill dumps. State governments could restructure electric utility pricing structures and stimulate a variety of efficiency incentives. National governments could pursue action in most of the policy areas of relevance. International organizations could coordinate programs in various parts of the world, manage transfers of resources and technologies, and facilitate exchange of monitoring and other relevant data.

The choice of policy instrument depends on the objective to be served. Although this analysis of mitigation options does not include all possibilities, the panel is hopeful that it does identify the most promising options. This analysis provides the beginnings of a structure and a process for identifying those strategies that could appropriately mitigate the prospect of greenhouse warming.

CONCLUSIONS

There is a potential to inexpensively reduce or offset greenhouse gas emissions in the United States. In particular, the maximum feasible potential reduction for the options labeled "net benefit" and "low cost" in Table 6.2 totals about 3.6 billion tons (3.6 Gt) of CO₂-equivalent emissions per year. (Here, as elsewhere in the report, tons are metric.) This is a little more than one-third of the total 1990 greenhouse gas emissions in the United States and represents an optimistic upper bound on what could be achieved using these options.

A lower bound can be estimated from Figure 6.4. Arbitrarily using a cutoff of between \$10 and \$20 per ton of CO₂-equivalent emission reduction would produce a level of about 1 Gt of CO₂-equivalent emissions per year, or a little more than 10 percent of current greenhouse gas emissions in the United States.

This analysis suggests that the United States could reduce its greenhouse gas emissions by between 10 and 40 percent of the 1990 level at very low cost. Some reductions may even be at a net savings if the proper policies are implemented.

TABLE A.4 Estimated 1985 Global Greenhouse Gas Emissions from Human Activities

	Greenhouse Gas Emissions (Mt/yr)	CO ₂ -equivalent Emissions ^a (Mt/yr)	
CO₂ Emissions			
Commercial energy	18,800	18,800	(57)
Tropical deforestation	2,600	2,600	(8)
Other	400	400	(1)
TOTAL	21,800	21,800	(66)
CH₄ Emissions			
Fuel production	60	1,300	(4)
Enteric fermentation	70	1,500	(5)
Rice cultivation	110	2,300	(7)
Landfills	30	600	(2)
Tropical deforestation	20	400	(1)
Other	30	600	(2)
TOTAL	320	6,700	(20)^b
CFC-11 and CFC-12 Emissions			
TOTAL	0.6	3,200	(10)
N₂O Emissions			
Coal combustion	1	290	(>1)
Fertilizer use	1.5	440	(1)
Gain of cultivated land	0.4	120	(>1)
Tropical deforestation	0.5	150	(>1)
Fuel wood and industrial biomass	0.2	60	(>1)
Agricultural wastes	0.4	120	(>1)
TOTAL	4	1,180	(4)
TOTAL		32,880	(100)

^aCO₂-equivalent emissions are calculated from the Greenhouse Gas Emissions column by using the following multipliers:

CO ₂	1
CH ₄	21
CFC-11 and -12	5,400
N ₂ O	290

Numbers in parentheses are percentages of total.

^bTotal does not sum due to rounding errors.

NOTE: Mt/yr = million (10⁶) metric tons (t) per year. All entries are rounded because the exact values are controversial.

SOURCE: Adapted from U.S. Department of Energy, 1990. *The Economics of Long-Term Global Climate Change: A Preliminary Assessment—Report of an Interagency Task Force*. Springfield, Va.: National Technical Information Service.

CO₂ that would produce the same amount of forcing at the surface is calculated. This is the CO₂ equivalent for that specific concentration of the other greenhouse gas. The respective costs per ton for different options can then be compared directly. It is important to recognize, however, that these calculations allow comparison only of initial contributions. They do not account for changes in energy-trapping effectiveness over the various lifetimes of these gases in the atmosphere.

35. What mitigation options are most cost-effective?

The panel ranks options for reducing greenhouse gas emissions or removing greenhouse gases from the atmosphere according to their cost-effectiveness. Some of these options have net savings or very low net implementation costs compared to other investments. The options range from net savings to more than \$100 per metric ton of CO₂-equivalent emissions avoided or removed from the atmosphere. The most cost-effective mitigation options are presented in Table A.5.

36. What are examples of options with large potential to reduce or offset emissions?

The so-called geoengineering options have the potential of substantially affecting atmospheric concentrations of greenhouse gases. They have the ability to screen incoming sunlight, stimulate uptake of CO₂ by plants and animals in the oceans, or remove CO₂ from the atmosphere. Although they appear feasible, they require additional investigation because of their potential environmental impacts.

37. How much would it cost to significantly reduce current U.S. greenhouse gas emissions?

It depends on the level of emission reduction desired and how it is done. The most cost-effective options are those that enhance efficient use of energy: efficiency improvements in lighting and appliances, white roofs and paving to enhance reflectivity, and improvement in building and construction practices.

Figure A.4 compares mitigation options, and Table A.5 gives the panel's estimates of net cost and emission reductions for several options. It must be emphasized that the table presents the panel's estimates of the *maximum* technical potential for each option. The calculation of cost-effectiveness of lighting efficiency, for example, does not consider whether the supply of light bulbs could meet the demand with current production capacities. Nor does it consider the trade-off between expenditures on light bulbs and on health care, education, or basic shelter for low-income families. In addition, there is a danger of some "double counting." For example, in the area of energy supply both nuclear and natural gas energy options assume re-

TABLE A.5 Comparison of Selected Mitigation Options in the United States

Mitigation Option	Net Implementation Cost ^a	Potential Emission Reduction (1 CO ₂ equivalent per year)
Building energy efficiency	Net benefit	900 million ^c
Vehicle efficiency (no fleet change)	Net benefit	300 million
Industrial energy management	Net benefit to low cost	300 million
Transportation system management	Net benefit to low cost	50 million
Power plant heat rate improvements	Net benefit to low cost	50 million
Landfill gas collection	Low cost	200 million
Halocarbon-CFC usage reduction	Low cost	1400 million
Agriculture	Low cost	200 million
Reforestation	Low to moderate cost ^d	200 million
Electricity supply	Low to moderate cost ^e	1000 million ^c

^aNet benefit = cost less than or equal to zero

Low cost = cost between \$1 and \$9 per ton of CO₂ equivalent

Moderate cost = cost between \$10 and \$99 per ton of CO₂ equivalent

High cost = cost of \$100 or more per ton of CO₂ equivalent

^bThis "maximum feasible" potential emission reduction assumes 100 percent implementation of each option in reasonable applications and is an optimistic "upper bound" on emission reductions.

^cThis depends on the actual implementation level and is controversial. This represents a middle value of possible rates.

^dSome portions do fall in low cost, but it is not possible to determine the amount of reductions obtainable at that cost.

^eThe potential emission reduction for electricity supply options is actually 1700 Mt CO₂ equivalent per year, but 1000 Mt is shown here to remove the double-counting effect.

NOTE: Here and throughout this report, tons are metric.

SOURCE: Chapter II of the Mitigation Panel report.

placement of the same coal-fired power plants. Table A.5, however, presents only options that avoid double counting. Finally, although there is evidence that efficiency programs can pay, there is no field evidence showing success with programs on the massive scale suggested here. Thus there may be very good reasons why "negative cost options" on the figure are not implemented today.

The United States could reduce its greenhouse gas emissions by between 10 and 40 percent of the 1990 levels at low cost, or perhaps some net savings, if proper policies are implemented.

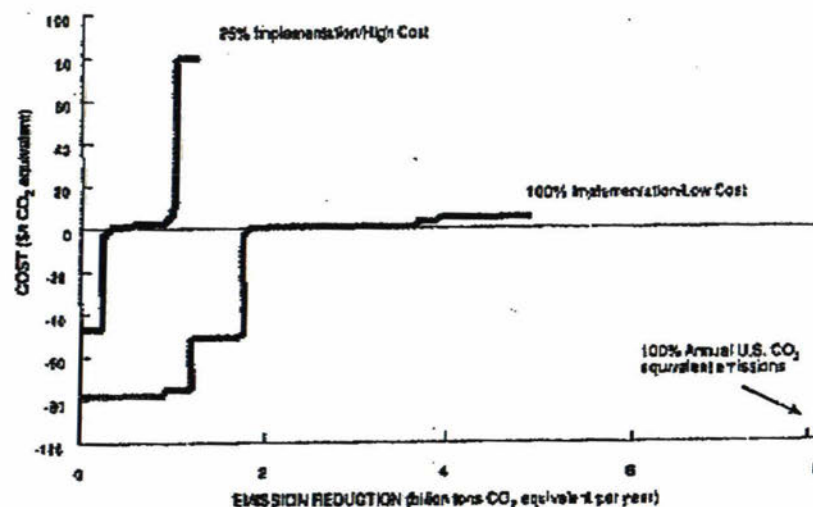


FIGURE A.4 Comparison of mitigation options. Total potential reduction of CO₂-equivalent emissions is compared to the cost in dollars per ton of CO₂ reduction. Options are ranked from left to right in CO₂ emissions according to cost. Some options show the possibility of reductions of CO₂ emissions at a net savings.

SOURCE: Chapter II of the report of the Mitigation Panel.

ADAPTING TO ADDITIONAL GREENHOUSE WARMING

38. Will human and natural systems adapt without assistance?

Farmers adjust their crops and cultivation practices in response to weather patterns over time. Natural ecosystems also adapt to changing conditions. The real issue is the rate at which human and natural systems will be able to adjust.

39. At what rates can human and natural systems adapt?

Many human systems have decision and investment cycles that are shorter than the time in which impacts of climate change would become manifest. These systems in the United States should be able to adjust to climate change without governmental intervention, as long as it is gradual and information about the rates of change is widely available. This applies to agriculture, commercial forestry, and most of industry. Industrial sectors with extremely long investment cycles (e.g., transport systems, urban infrastructure, and major structures and facilities) or requiring high volumes of water may require special attention. Coastal urban settlements would be

OKY

Climate Change Technology Options

1. Buildings:

Buildings produce 35% of US CO₂ and consume over 2/3 of all US electricity. Energy use in buildings has increased 2.5%/year since 1986. The construction industry has not gone through the transformation that has reshaped most American manufacturing because of fragmented local regulation and no tradition of research or systems engineering. It appears possible to cut greenhouse emissions in buildings by a factor of 2 or more (and in some cases make buildings net energy producers) using methods that both improve building quality and lower cost. Leaders in the industry, its suppliers, the companies that insure and finance buildings, and state and local regulators are willing to join us in capturing the potential of making sharp reductions in building energy by improving products and production methods and streamlining regulation. Our strategy involves near-term actions to reinvent federal, state, and local regulations to create a near-term demand for the many technologies already available and a research partnership with builders and suppliers aimed at dramatically new building designs and appliances.

	Actions	Federal Cost \$ millions	Savings (MMT)	
		(per year)	2010	2030
PATH	- A partnership linking builders, building suppliers (windows, appliances, etc.), insurance companies and federal/state/local offices designed to streamline federal, state, and local regulations and create markets for building designs that achieve major energy savings while reducing costs. Partners will seek expedited permitting and reciprocity from participating communities. Insurance companies will play a key role by encouraging construction quality. - Large procurements for new housing units meeting ambitious performance specifications will be made in Colorado, Florida, and Los Angeles. - Federal agencies will participate by streamlining federal regulations, helping communities craft performance-based procurement instruments, helping review and certify structures claiming to meet performance specifications, forming research partnerships to develop pre-commercial components and design concepts (not costed here, see long-term section) and providing overall national leadership and an infrastructure for communication between participating communities	\$10 HUD \$10 NIST \$5 DOE		

	Actions	Federal Cost \$ millions	Savings (MMT)	
		(per year)	2010	2030
Home Energy Ratings	Widely advertise the value and use of a voluntary rating system for new and existing homes which would assist homebuyers make choices based on sound information about energy/environmental characteristics of the building			
Energy Star Customer Service Program	Provide national leadership to encourage partnership with utilities, energy service companies, and others interested in offering improved service to their residential and commercial customers by helping them reduce their energy usage and energy bills. For commercial customers, including schools, hospitals, and shopping malls, this could also include installing, financing, and maintaining on-site electricity generation systems that would reduce overall energy usage. Goals would include: - increase the installation rate of high efficiency equipment for routine replacements of key building equipment and appliances - increase the market penetration rates of intelligent building management systems	? EPA/DOE		
Million Solar Roofs	- partnership combining businesses, federal, state, and local governments to develop and communicate approaches to voluntary deployment programs. - government purchases of rooftop systems for government facilities (through executive order?); - develop special programs for federal loan programs (SBA, FEMA, FmHA, RUS, Fannie Mae among others) already authorized to provide low-cost financing (20year loans 5% below bank rates are possible) - promotion by federal agencies	\$10 DoE	0.2	30-50
Advanced Building R&D	- lighting - advanced appliances - sensors and controls - tools for integrated building design/analysis			
New Appliance Standards	Enforce existing appliance standards and develop ambitious standards using existing authority for washing machines and other appliances. Options for "plug loads"?			

2. Transportation

Cars, trucks, aircraft, and other transportation produces 33% of US CO₂ and has grown an average of 2.3% annually since 1986. Low fuel prices and constant increases in vehicle miles traveled make this the fastest growing source of US greenhouse gases. The average efficiency of new US cars and light trucks has been declining since 1985. All attempts to affect the industry through fuel taxes or fuel economy regulation face fierce opposition. Research may produce radically new technologies capable of delivering large gains in efficiency without increasing the cost of vehicles or travel. This program focuses entirely on research designed to reduce fuel consumption of cars, trucks, and aircraft by factors ranging from 50-200%.

	Actions	Federal Cost \$ millions	Savings (MMT)	
		(per year)	2010	2030
PNGV	- Increased funding in bottleneck technologies may be needed to increase the probability of meeting the 80mpg goal. These include: ⇒ lithium ion batteries (key bottleneck is electric storage) ⇒ low-cost electric power controls in small volume (see electric controls below) ⇒ innovative hydraulic storage and pump/motor hybrids ⇒ low-cost composite materials	0-100 above existing budget		
New Tech for Air Travel	- Reduce energy consumption per passenger mile of air travel by []% - Next generation air-frames and high-bypass engines increase efficiency 10-15% - Use of advanced air-traffic control systems can reduce fuel requirements by []% by avoiding delays and permitting optimized routes			
PNGV for Heavy (>8500lb) Trucks	25 to 50 percent improvement in fuel economy for long haul trucks and 100 to 200 percent improvement for urban delivery vehicles. - focus on improved diesels, hybrid drive-trains	25-30		10-20

3. Industry

Industry produces 33% of US greenhouse gases – 78% of it in six industrial sectors: pulp and paper, chemicals, petroleum refining, glass, aluminum, iron and steel, and metal casting. Our strategy is to focus on accelerating the adoption of technologies which could have a major impact in a few areas where the payoff is high and regulatory or other barriers appear to be blocking adoption. Over the long-term, research partnerships can achieve efficiency gains with biotechnologies and other methods.

	Actions	Federal Cost \$ millions	Savings (MMT)	
		(per year)	2010	2030
Accelerate Combined Heat and Power (use waste biomass or natural gas)	- establishment of expedited and standardized environmental permitting processes for advanced turbine-based industrial Combined Heat and Power systems; - performance-based emissions standards as for utility generator emissions in the new EPA rules on SOx and NOx; - credits for efficient C.P. systems that displace utility generation emissions in emissions permit applications; - strong encouragement by the Federal Government that unencumbered, open access to the electricity distribution system by efficient C.P. and on-site generation be included in state and national utility restructuring legislation; - common depreciation schedules for all on-site and utility-generation assets. - ensure focus on near-term opportunities in forest product industries including paper processing's supply of "black liquor" and "hog fuels" - develop information, tools, best practices, and training.			
Expand Industries of the Future Research Partnerships	- Establish priorities in long-term research identified in the roadmaps already developed by industry groups and increase federal investment - Topics would include such things as biocatalysis and other methods for achieving high productivity chemical production and separations at low cost and with low emissions, inert anodes for aluminum production, and electromagnetic metal casting.			
Industrial Power	Expand existing Motor Challenge Allied Partner network capture energy efficiency opportunities employing market-ready industrial steam system and compressed air	\$10 DOE	30-45	

	system technology. - Partnership will develop and communicate improved designs for efficient air and steam systems in addition to electric motor control - Provide training programs for industrial designers and expand programs in engineering schools.			
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4. Cities

The local transportation policies, urban design, and other urban policies have a profound influence on carbon production. []% of vehicle miles driven occur in metropolitan regions. Portland Oregon demonstrated that a growing economy did not need to translate into growing amounts of travel and urban congestion given sensible programs in highway construction, parking policies, mass transit, and zoning. Using a similar program, Portland stabilized growth in per-capita VMT over the last 5 years. Some of the programs considered (building retrofits and increased use of non-auto transportation) could have impacts in the near term. Programs to encourage changes in urban structure that minimize travel needs are important but will have influence only over the long-term.

	Actions	Federal Cost \$ millions (per year)	Savings (MMT)	
			2010	2030
Clean Cities	- Strengthen and focus existing programs in DoT/NEXTEA, EPA, and DoE to encourage improved urban planning, increased use of buses, jitneys, and other alternatives to automobile travel, and programs to encourage greater efficiency in public buildings including schools and hospitals. - Support Urban Initiative, Sustainable Development Challenge Grants - Support en regional pilot projects to overcome institutional and analytic barriers to better integration of transportation and land use planning as proposed in the President's budget	\$30 DoT (trust fund) \$? EPA ? DOE	18	

5. Agriculture

Programs in agriculture aim to develop production methods that achieve large reductions in inputs of agricultural chemicals and create new economic opportunities for rural communities through crops that can produce an energy source which can be used with zero net contribution of greenhouse gases. The strategy relies on using authorities available in the farm bill to encourage early experiments in areas where niche-markets can be identified for biomass energy crops and a research program designed to achieve much larger markets in the future.

	Actions	Federal Cost \$ millions	Savings (MMT)	
		(per year)	2010	2030
Biofuels	- Restructure ISTEAs proposal for extension of ethanol tax credit so that it will apply to all biomass-derived fuels on an equitable basis <i>And/OR</i> - Provide funding to share the cost of a large-scale facility for converting biomass to a liquid fuel (ethanol, ethanol, synthetic diesel)			
Farm-Bill for Biomass	Review use of Conservation Reserve , Rural Economic Development, Flood Control and Drainage, riparian control, and other programs to encourage experiments with sustainable biomass crops	2 USDA		
New Crops for Biomass	- Apply advanced genetic techniques to create drought/disease/pest-resistant biomass crops capable of being delivered for less than \$20/dry ton/ha - Develop production/harvesting methods compatible with sound conservation/wildlife management plans - Develop low-cost harvesting, drying, transport methods	20 USDA		
Low Input Agri-culture	Launch an ambitious program to achieve the yields of "green revolution" hybrid grains without use of nitrogen fertilizers. (fixing nitrogen in microorganisms associated with the plant root structure, nitrogen-fixing cyanobacteria capable of reproducing in the soil, and other concepts)			

6. Utilities

Electric utilities produce about a third of all US greenhouse gases 88% of which results from coal-fired power plants. Emissions have grown about 3.5% annually since 1990. Our strategy here focuses on using the opportunities presented as states and the federal government consider sweeping deregulation of electric generation. The goal is, at a minimum, to maintain incentives for efficiency and renewable energy that are at least as powerful as those available under existing regulation. Several options would increase incentives. In addition, we suggest options for accelerating development and adoption of renewable energy technologies such as wind which may be able to provide competitive power in some parts of the country.

	Actions	Federal Cost \$ millions	Savings (MMT)	
		(per year)	2010	2030
Public Benefits Charge	- A fund similar to the Universal Service Fund for telecommunications would be established to cover poor and rural customers as well as to provide state resources to fund efficiency and renewable programs which would be eliminated under deregulation. - Federal service charge of a tenth of a cent per kWh (1 mill/kWh) would be collected and given to states which charge an additional tenth of a cent for state operations.	\$3,000 (scoring?)		
Renewable Portfolio Standard	As a part of utility restructuring, require either every generator or every retail power supplier to have a certain percentage of renewable energy credits in their resource mix, equal to some percentage of its total annual electricity sales. A retail seller can earn credits by owning renewable electric plants and generating credits, purchasing renewable electric power and receiving credits, purchasing credits from a renewables generator, or perhaps from a specialized REC market.			
Encourage Green Procurement	- Help states experiment with methods for encouraging programs in which individual utility customers would be given the option of paying somewhat higher bills to cover the cost of purchasing low-carbon energy. - Require that information be made available to facilitate state programs whereby customers could voluntarily indicate a willingness to pay a premium for electricity generated from low-pollution (low CO₂) generating facilities. Technical assistance (information infrastructure) could be provided for state green energy programs			

Renewable Procurements	Help utilities and other potential buyers of renewable energy purchase equipment (possibly through purchasing consortium such as the "green carrot" procurements) that provides the lowest-cost to customers while creating a market that can encourage innovative technologies. This might, for example, permit a firm to develop a large wind field including construction of required transmission to connect the field to a suitable grid and possibly use of underground compressed air energy storage (CAES) to increase capacity factor and load-following characteristics of the and therefore the value of the power.			
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7. Basic Research

Stabilizing global greenhouse gas concentrations over the next few decades will require major changes in the way energy is produced and consumed. Achieving these goals requires investment in long-range, high-risk technologies which do not meet the investment objectives of private firms. The programs proposed here would provide federal investment for basic science and basic engineering in key areas. Most of the technologies supported here would benefit many different business sectors.

	Actions	Federal Cost \$ millions	Savings (MMT)	
		(per year)	2010	2030
Fuel Cells for Cars and Other Light-Duty	20-40 \$/kW fuel cells capable of meeting the weight/volume/maintenance requirements of an automobile - low-cost/volume gasifiers for converting liquid fuels to hydrogen - low-cost/efficient on-board hydrogen storage			
Fuel Cells for Buildings, Trucks, and other Heavy Duty Vehicles	100-300 \$/kW fuel cells compatible with heavy vehicles (trucks, rail) and buildings (cogeneration units producing electricity and power). - low-cost/high-reliability reformers for converting natural gas - emphasis on range of technologies: PEM, molten carbonate, solid oxide			

Other Basic Energy Research	• lightweight materials for vehicles and other applications • sequestration of CO₂ in aquifers and in other mechanisms • advanced nuclear cycles [safe, proliferation-resistant, environmentally benign, cost-effective] • bulk energy storage • semiconductor research for advanced photovoltaics • inexpensive devices capable of switching large electric currents rapidly • molecular biology for bioprocessing, biofuels, and low-input agriculture			
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8. Federal Procurement Policy				
Various	• Options being prepared by a separate policy group			

Policy

5

MR. PRESIDENT

9-15-97

THE WHITE HOUSE
WASHINGTON

OK

September 12, 1997

MR. PRESIDENT:

I would advise you to steer clear of the statement you made in your speech Tuesday to the effect that we could reduce greenhouse gas emissions by 20% tomorrow with available technology.

As you know, many people believe this is theoretically true if one assumed perfect dissemination of the most energy efficient refrigerators, air conditioners, light bulbs, insulation, etc. This point was made in a Weekly Economic Briefing that CEA sent you on July 25 (relevant page attached).

✓ However, as the WEB also pointed out, such perfect dissemination is unrealistic and even very broad dissemination would be tough to achieve; indeed, as the WEB pointed out, economists tend to be skeptical about broad dissemination in light of people's common resistance to many green technologies.

Copied
COS ✓
Stern

More to the point, the press and some others are misconstruing your remark to suggest that you really think we could promptly reduce emissions by 20% with no pain. So I would recommend avoiding that particular comment.

Todd Stern

SPECIAL ANALYSIS

Is There a Free Lunch in the Refrigerator?

Economists are typically skeptical of the argument heard in energy policy debates that alternative energy-saving technologies are readily available at no extra cost to consumers. They recognize that people do not always take advantage of cost-effective, energy-efficient technologies that, in the long run, are good for both the pocketbook and the environment. At current energy and product prices, however, many consumers may not be willing to experiment with compact fluorescent light bulbs, improved thermal insulation, better heating and cooling systems, and energy-efficient appliances.

Consumer preferences. Although recent assessments of energy-savings opportunities based on engineering studies suggest that from 20 to 25 percent of existing greenhouse gas emissions could be eliminated at no additional costs, many people resist these new "green" technologies. Why? A reason is that people act as if they have a short time horizon, perhaps because they are uncertain about future energy prices and the reliability of the technology. Several studies have estimated that when consumers buy air conditioners, space-heaters, water-heaters, and refrigerators they implicitly apply a substantial discount to future cost-savings. Their time horizon appears to be much shorter than the time horizon reflected in market interest rates. Even when they are presented with estimates of the likely future cost savings, they pay more attention to immediate outlays. 11/7

Moreover, factors other than energy efficiency also matter to consumers. They care about quality and features, as well as the time and effort required to learn about a new technology and how it works. Consumers may perceive a risk that the energy savings will not be realized, and may be averse to such risks. Finally, even if a technology is cost-effective in its energy use on average, it may not be cost-effective for people who use little energy.

Environmental concerns. Why do we care whether people use energy-efficient technologies? A key reason is that the burning of coal and other fossil fuels results in environmental damage and global warming. Improved information about the benefits of buying energy-efficient technologies could affect consumer decisions. For example, the government requires appliance labels to include information about likely energy bills, which allows consumers to make informed choices. The evidence suggests, however, that many people still prefer conventional appliances—at least at current energy prices.

As our experience with the oil shocks of the 1970s shows, choices do change when prices rise. Thus, the economist's view is that the most effective way to curb energy consumption is to raise the price of energy to reflect the harmful effects on the environment of burning fossil fuels.

Policy

ALCALDE & FAY

GOVERNMENT & PUBLIC AFFAIRS CONSULTANTS

FACSIMILE TRANSMISSION

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DATE: August 8, 1997

TO: Judd Stern

FAX #: 202-456-2215

FROM: Richard Rosenzweig

NUMBER OF PAGES: Cover Page + Page(s)

COMMENTS:

Here is the proposal we discussed.
You will have the other material
Monday morning.

July 31, 1997

MEMORANDUM

TO: Participants in August 27 Meeting

FROM: Bob Nordhaus, Van Ness Feldman, P.C.
Dan Dudek, Environmental Defense Fund

RE: Pooling Concept

In our discussion in our July 10 meeting of EDF's pooling proposal in the last meeting, we identified three areas that needed further discussion at the scheduled August 27 meeting:

- (1) How the pool would work.
- (2) How the pool's operations would relate to any future domestic constraints on greenhouse gas (GHG) emissions.
- (3) Whether the U.S. could get international credit for early reductions by the pool.

The attached papers address the first two questions. The third issue is left to further discussion at the August meeting.

The objectives of the pool proposal are set forth in a short paper prepared by Dan Dudek (Attachment A). An outline of the operation of the pool, prepared by Bob Nordhaus and Dan Dudek appears in Attachment B.

Attachment C, prepared by Bob Nordhaus, addresses the question of how the pool's operations would relate to future U.S. regulation of CO₂ emissions, and lays out four options for dealing with future regulation.

OBJECTIVES OF A GREENHOUSE GAS RISK MANAGEMENT POOL

There is a unique opportunity at this time to establish a rational greenhouse gas management system similar to the flexible market-based environmental policies that companies like yours have had positive experience with. The US government has adopted an EDF design for its protocol submission and substantial progress has been made in elevating international understanding of emissions trading. Nonetheless, significant barriers remain to the adoption of an environmentally and financially effective international policy. Chief among these are those nations who wish to see a more inflexible international regime such as that advocated by the European Union. While we may disagree about the overall timing and stringency of required reductions, I believe that we have substantial agreement concerning the structure of an international policy. In that regard, EDF seeks to establish relationships with other organizations sharing that interest and to establish institutional arrangements that would foster this outcome.

If Kyoto manages to produce consensus among nations, there is likely to be a substantial lag between agreement and the implementation of legally binding obligations. If Kyoto doesn't produce consensus, the climate issue will not disappear and is likely to reemerge with a greater demand for action. From our environmental perspective, we would like as much commitment to early reductions as possible. From your perspective, you would like to be assured that the reductions that you would produce from demonstrations or other activities would be legally available to the company whenever legal obligations are implemented. It is also likely that unless arrangements of the sort proposed below can be made credible that existing regulatory authorities will be used to begin the reduction of GHG emissions from business as usual forecasts. In that regard, a new not-for-profit organization, the Environmental Resources Trust (ERT) founded with the assistance of EDF is undertaking the development of a private GHG trading system. ERT differs from EDF in that it can take an active part in transactions of the sort discussed in this brief memo. ERT's trading project would act both to demonstrate key policy features of such a system as well as to create legitimacy for reductions produced prior to legally binding obligations under Kyoto.

The general objectives of private partnerships on greenhouse gas emissions management and trading are:

- to identify and develop the protocols necessary for low transactions cost trades to develop and implement a private trading system which would encourage and reward early greenhouse gas reductions
- to demonstrate the capabilities of such a system to produce environmentally effective and financially beneficial transactions across companies, sectors, countries and gases.

- The overall general structure of a greenhouse gas risk management pool consists of the following general elements:
- a commitment to specific emissions levels
- a reporting agreement
- transactions if desirable or necessary.

The attached documents describe the elements of a private GHG trading system.

ELEMENTS OF POOL PROPOSAL

I. CONCEPT

- A. Pool is a voluntary private agreement that is legally enforceable among members.
- B. Each member has a decadal GHG emissions limitation which is negotiated with the pool.
- C. Each member complies with pool obligation by meeting its emissions limitation, or by trading within pool, purchasing of options, banking, or (if certified by pool) trading outside pool or joint implementation.

II. BASIC MEMBER RESPONSIBILITIES

A. Membership

- 1. Initial pool consists of owners or operators of electric generation units. Provision would be made for companies from other sectors to opt into pool

B. Cumulative Emission Budget (CEB)

- 1. Each member agrees to a GHG emissions budget for 2000-2010 decade. Budget is in terms of tons of CO₂ emissions (or carbon equivalent). Each member negotiates a specified CO₂ target. The benchmark for negotiations of CEB would be actual CO₂ emissions in CY 2000 times 10; however, companies could negotiate different levels with the pool to reflect individual circumstances.
- 2. Each member would be allocated a number of tons of tradeable carbon equivalent units (CEUs) equal to its CEB.
- 3. Each member's CEB is allocated among the member's generating units. Obligation follows the unit if it is transferred to another member or to entity outside pool, unless member's obligations to the pool are modified to reflect transfer of unit.
- 4. Greenhouse gases include CO₂, CH₄, and N₂O.

C. Annual Emission Milestones (AEM)

1. Members negotiate year-by-year emission milestones and are allocated CEUs for each year from member's CEB.
2. Each member must meet that year's AEM by showing that as of the end of the calendar year:
 - i. emissions do not exceed annual emission milestone
 - ii. banked CEUs are available from a previous year
 - iii. acquisition of either annual or previous CEUs from other pool members through:
 - a. sales
 - b. options
 - iv. acquisition of qualifying CEUs from non-pool members subject to review and approval of the pool's Management committee including credited CEUs through joint implementation.
3. If a member does not meet its milestone in a year, it must purchase CEUs from the pool at a price and on terms set by the pool.

D. Annual Reporting of Emissions to the Pool.

E. Displaced Generation

Pool agreement requires all of members' generation (as of time of signature) to be committed to pool. Issue of displacement of generation to units outside of pool could be addressed either in pool agreement or in negotiations for regulatory credit for reductions by pool.

F. Allocation of Attained Emission Reductions.

Agreement may contain provision for allocating to individual members credit for a specified share of any emission reductions attained by pool.

III. POOL FUNCTIONS

A. Monitor Member Compliance with Contractual Obligations

1. Evaluation of AEM on May 31 each year (geared to Title VIII Annual CO₂ Emissions Report)
2. Evaluation of CEB

B. Management of CEU Accounting System

1. banked reductions
 2. transfers among pool members
 3. option purchases and sales
 4. out-of-pool transfers
- C. Provide Additional Trading Infrastructure through an Annual Electronic Trading System (Spot Market)
 - D. Review and Approval of Non-Member Transactions
 - E. Provide Liquidity
 - F. Reporting of Results of Pool Operations
 - G. Potential Role in Complying with Future Regulatory Requirements

IV. POOL STRUCTURE

- A. Implemented Through a Pool Agreement
 1. conditions for membership
 2. member obligations
 3. fees and operating costs
 4. operations of member accounts
 5. rules governing bilateral transactions
 6. services to be provided
 7. enforcement guidelines
 8. governance and conflict resolution process
- B. Governance
 1. Management Committee with responsibilities:
 - i. review and approval of purchases by pool members from non-members
 - ii. determine the amount of "excess" banked emissions reductions a member would be eligible to sell to a non-member
 - iii. determine emissions reductions crediting from member-initiated off-system reduction projects
 2. Pool Agreement could only be changed by 2/3rds vote representing combined total of 75% of the pool's total CEB

V. DESIGN ISSUES

- A. New Members Over Time
- B. Displaced Generation
- C. Joint Implementation
- D. Sanctions and Enforcement
- E. Reporting Requirements
- F. Fees
- G. Staffing

RELATIONSHIP TO FUTURE REGULATION

Because the pool proposal contemplates that the pool would commence operation well before either domestic or international constraints on GHG emissions become operative, questions will arise (as they have with Climate Challenge) as to the relationship between pool operations and eventual domestic regulation of GHG. In particular:

- (1) If allowances or permits are allocated on the basis of historic emissions, will pool participants' baselines be set so as not to penalize them for early reductions?
- (2) Will pool participants otherwise get credit for early reductions once domestic regulation commences?
- (3) Can pool compliance obligation be substituted for individual company compliance obligations under whatever domestic regulatory system eventually is established?

These questions are important and it is not clear how they should be addressed at this stage of the debate, when neither the international nor domestic climate change framework has been established. There are, however, several approaches that could be considered. They are described below.

Option A. Pool members join pool in advance of any commitment from Congress or President with respect to future regulatory treatment of early reductions or other pool activities.

Under this option, pool members would rely on credibility of the pool and its reporting mechanism to obtain appropriate treatment of early reductions at the time Congress considers domestic regulatory legislation to implement U.S. international commitments.

Option B. Members join pool in reliance on statement of administration policy that early reductions will be recognized in any regulatory program that the President recommends in the future.

Under this option, members would rely on current and future administration "moral commitment" to credit early reductions in any future regulatory program. Continuing

operation of the pool could be made contingent on continuation of the commitment by future administrations.

Option C. Pool contracts with Executive Branch agency to provide specified early reductions in return for agreed-upon future regulatory treatment.

Under this option, agency would enter into binding contract with pool under which pool would agree to specified early reductions in reliance on government's commitment regarding future regulatory treatment. Agency would need specific statutory authority to enter into agreement. Such an agreement could not preclude Congress from providing regulatory treatment other than that provided in the agreement, but under United States v. Winstar, 116 S.Ct. 2432 (1996), pool members would have a damages remedy against the United States if the government reneged.

Option D. Leave relationship to future regulation open for later negotiation between pool members and government.

Under this option, the pool would be responsible for recording GHG commitments, reporting results, and operating the trading mechanism. The legal effect, if any, of the pool's operations under future regulation would be a matter to be negotiated between pool members and the government. This would permit the pool to operate as neutral stakeholder, rather than as advocate for particular regulatory treatment.

Policy

PRELIMINARY DRAFT: CLOSE HOLD
CLIMATE CHANGE EARLY ACTION CREDIT PROGRAM

August 25, 1997

Proposal: A Presidential announcement of Administration support for credit for early action by companies to reduce greenhouse gas emissions.

Such an announcement could provide a concrete display of our commitment to protect the environment by using market-based incentives. For example, the President could use the October White House Conference on Global Warming and Climate Change to announce that a select group of key energy-producing or consuming companies have agreed to take on emission reduction commitments to help meet our international obligations. He would also announce that, working together with these companies, we will undertake to develop a policy consistent with a list of principles that allows companies to gain credit for such early action. He would also reaffirm his commitment to an international protocol framework that combines realistic, binding emissions limits with maximum flexibility -- including international emissions trading and joint implementation.

Underlying Objective: Generating Corporate Support

A critical component of gaining public support for U.S. efforts to address climate change will be convincing a core set of industries that our policies will protect the environment without threatening economic growth -- and that the sooner they get involved, the easier the transition will be for them. An early action plan could be a central demonstration in this effort to gain corporate support. Several companies have already been taking action to reduce emissions, and we know that they and other companies are prepared to undertake even more efforts, but are seeking assurances that any emissions reductions they take now will earn them credit under whatever future regulatory framework may be established. Companies most likely to be interested in pursuing early credit would be a core group of energy and electric utility companies, as well as extremely energy-intensive industries such as aluminum and concrete producers.

Issues

Preliminary discussions with representatives from DOE, Treasury, CEA, Commerce, and EPA have revealed several difficult issues that -- depending on the specificity of the announcement -- may need to be resolved before we could announce an early credit proposal. Some are worried that these issues are sufficiently intractable as to raise fundamental doubts about the viability of the proposal itself.

- Degree of Administration commitment. The range of the Administration's commitment could extend from a simple statement that we support an early credit program as part of whatever emissions reduction system we submit for legislative approval, to a more detailed program that we negotiate with industry. Ultimately, the program itself is very likely to require domestic legislation and may have elements that will have to be included in the international agreement. Industry groups are

evaluating whether an Administration-only agreement would provide a legal basis upon which they would be able to gain credit for early action, even if subsequent legislative action altered the regulatory framework. (They cite a recent Supreme Court case, *U.S. v. Winstar Corp.*) But initial staff reactions to this argument revealed much skepticism about its practical feasibility, if not its legal standing.

In any case, it may be possible for the President to make a *conditional* commitment now -- that he will fight to include an early credit program in the relevant legislation -- and to have firms express an interest in participating *should the program become operational*. Three issues will need to be discussed further:

- How much corporate support will materialize while the legislative details remain ambiguous (i.e., perhaps for the next few years)?
- Is there any danger that firms will sue the U.S. Government if the program is not implemented because we fail to impose binding targets on emissions?
- How much will the corporate sector "pocket" this program -- and thus deny us any support when we need it -- if the early credit idea is floated before the targets and timetables are released? Is there a way to link more closely support for the early credit idea to support for (or at least reduced criticism of) binding targets?
- Baselines. In order to measure "early action," we need a baseline. We need to ensure that credits are only awarded for real improvements measured from the baseline. There are several possibilities:
 - The business-as-usual projection for the firm's sector;
 - The firm's 1990, 1995, 1997, or 2000 emissions;
 - The firm's 1990, 1995, 1997, or 2000 emissions, adjusted either upward or downward by a given percentage per year or in total
- Retroactivity and equity. We need to define eligibility not only in terms of actions relative to a baseline, but also the *timing* of those actions. Will actions only be eligible after the program is formally implemented in legislation? Or after it was initially announced by the President? Will firms that participated in the Green Lights program, or any of the other Climate Action Plan programs be allowed to get credit for those past efforts? If not, will they claim that they are being punished (relative to firms that act after the program is in effect) for helping the Administration try to meet its voluntary targets? The longer the retroactivity period, and thus the more activity that is "counted," the more expensive the early action program could be -- or the less valuable the early action credits. And what about new firms -- will they complain that the program is an unfair give-away to existing firms?

- Providing the future benefits. There are two broad choices for providing a future benefit.
 1. We could promise some specific future benefit for a given current action -- for example, every metric ton of carbon emissions cut below the baseline today will produce the equivalent of an x metric ton emissions right in the first year or first several years in which carbon permits are required. The attraction of this approach is that it provides some physical (although not necessarily financial) certainty to the benefit that firms will receive early action. The cost is that the government's liabilities are open-ended -- and if the initial permit year is sufficiently delayed, the early action credits could eventually represent a substantial share of the total value of the permits.
 2. We could cap the total benefits paid out under the early action program at some percentage of the total national emissions rights for the initial permit years. For example, we could cap the total benefits at X percent of the initial Y permit years. We would then give "early action credits" or "early action points" for appropriate actions. The benefit for each firm would then be determined by its share of total early action points multiplied by the aggregate capped value. The benefits themselves would presumably depend on the form of the domestic implementation package.
 - Under an auctioned permit system, the credits could take the form of a "pioneer price preference" -- a reduction in the auction price for firms with early credits.
 - Under a grandfathered permit system, they could take the form of grants of the permits themselves (this is also possible under an auction system, by carving out some portion of the permits for early credit give-aways rather than being auctioned).
 - Under other possible implementation packages, some reimbursement system could be devised.

It is important to note that regardless of how the benefits are provided -- unless they are defined in dollar terms now -- firms will not be able to determine with any precision the value of the early credits without knowing the U.S. target and timetable, the domestic implementation package, and the other details of the carbon emission reduction system. Thus, their commitments are likely to be conditional on achieving a reasonable target and timetable, combined with other flexibility provisions in the U.S. protocol proposal.
- Impact on national target. It is generally agreed that early domestic actions will not lift the U.S. national target for the initial permit years -- that is, any permits rewarded (either sold at a preference or given away) in exchange for early action will *not* be above and beyond the U.S. national total for the initial permit years. As one specific example, a capped carve-out for early credit coupled with an auctioned permit system would involve reducing the number of permits to be auctioned by the amount of the capped carve-out -- not adding the capped amount on top of the U.S. total (which would cause the U.S. to exceed its international obligation). For early JI programs, the situation could be more complicated (see below).

- **Joint implementation.** Many corporations are interested in receiving early action credit for JI programs. In addition to raising questions about verifying additionality, such early credit for JI raises other issues -- such as whether the U.S. national target in the initial permit years should be adjusted for early JI credits. (Permission for such adjustments to the U.S. national cap would presumably have to be included in the international agreement. And implementing the system would require an international body to sanction and approve the JI programs before the initial permit year.) In addition, we must decide whether all JI programs -- including ones under the current pilot program -- should be eligible, or only JI programs begun after the conclusion of the pilot program. For example, we could choose to reward early action by providing credits that any projects generate after the conclusion of the pilot phase, provided the international agreement allows it.

Timing

In order for any announcement to happen, the Administration will have to quickly decide that it is ready to develop such a program, and to meet with a core group of the interested companies to nail down the details of how we would together develop a program outline. We need to determine how explicit our discussions with industry should be in determining: how emissions base-lines are established (against which any early action is measured and credited); how emissions compliance are reported and monitored prior to the establishment of any regulatory framework; and whether overseas emissions-reductions by U.S. companies will gain credit (i.e., joint implementation).

Process to resolve issues

If the Administration agrees to explore a program for early action credit, we would begin by preparing for a Presidential announcement on October 6 of an agreement for future collaboration. Following the conference, we would then make more explicit the content of such a program, with an aim of announcing it at some point in the run-up to Kyoto. Preparing the initial announcement for the conference will require the following meetings to take place:

- 9/5: Core group meeting to discuss and approve beginning discussions with a working group of interested businesses.
- 9/9: Initial meeting with industry group. Signal from Administration that collaborating on a program for early action credit is being given serious consideration, but it has to be met with serious commitment and serious legal framework on the part of companies. The meeting would send those companies away with a mission to come back with a) what is acceptable as an early reduction crediting device; b) what commitment they need from the Administration to commit to early reductions; c) what level of early action the companies would be willing to commit to; d) what legal framework they would establish or submit themselves.
- 9/16: Second meeting with industry group; formal presentation on these four points.
- 9/16-29: Finalize the outline for a cooperative program, and plan roll-out.

Policy



EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

SENIOR ECONOMIST

7 August 97

MEMORANDUM FOR TODD STERN

From: Rosina Bierbaum *RB*
Jason Shogren *JS*

RE: Voluntary programs for climate change

Background.

You asked for information on the existing voluntary programs to reduce greenhouse gas emissions. Here is our initial response based on a quick review of the literature. If you wish, we can get more detailed information or arrange for briefings.

The Climate Action Plan (CCAP) put into place by the USG in 1993 consisted of over 40 voluntary actions across most sectors: residential and commercial buildings, industry, transportation (only a few), energy supply, forestry, and land-use changes. These CCAP actions were projected to reduce emissions by 108 million metric tons of carbon (MMTC) by 2000, enough to return US emissions to 1990 levels (if energy prices had remained high and the US economy had not grown so vigorously). In the US National Communication (required by the framework convention) released yesterday by the State Department, USG now estimates that CCAP will reduce emissions by 76 MMTC in 2000. To date, however, the best DOE and EPA guess is that today these programs have achieved over 15 percent (12-14 MMTC) of this revised goal.

Two factors that have limited the effectiveness of CCAP are: (1) funding levels have been at about 50 percent due to Congressional opposition; and (2) the energy prices have fallen more than expected. Also 11 of the 44 programs have been terminated.

How well have the voluntary programs worked thus far?

- **CCAP.** There has been little evaluation of the effectiveness of the CCAP program. In June, GAO released its review of four EPA's voluntary climate change programs. GAO concluded that "EPA's projections of future reductions in greenhouse gases are not consistent with experience to date for three of the four programs but are consistent with the fourth program (the coalbed methane outreach program)." One page summaries of the four programs are attached. Participation rates have fallen behind expectations.

- **Other voluntary programs.** For other environmental issues, a recent review of several voluntary industrial programs concluded: "we cannot show that these programs have made a major contribution to either environmental improvement or to lowering the cost of the pollution control system." The programs that seem to have worked had relatively simple and clear objectives understood by both the government and business; enabled participants to have a major voice in the establishment of goals; and granted significant flexibility for implementing program objectives. In general, these programs mandate performance goals rather than technology. Not surprisingly, industry liked programs that increased economic benefits, competitive advantage, and flexibility. It might be worthwhile to examine in more depth the elements of some of the programs (33/50) that GEMI finds successful.
- **DOE's Industries of the Future program.** This program is a collaborative effort between industry and government to develop "technology roadmaps" to reach goals of energy-efficiency and "competitiveness" in seven industries. The industries are aluminum, chemicals, forest products, glass, metal casting, petroleum, and steel. Although the program is only a year old, DOE is now actively funding RFPs consistent with the roadmap. This new effort could serve as a basis to develop further voluntary actions with industry since it is already in place.

Attachments: Scorecard of CCAP emission reductions
 One-page summary of 4 voluntary climate change programs
 "Industrial Incentives for Environmental Improvement" GEMI report
 Industries of the Future

Summary of Greenhouse Gas Emissions-Reduction Actions

Million Metric Tons of Carbon Equivalent

Source: U.S. Climate Action Report—1997

Action Number	Action Title	1993 Action Plan Estimate for 2000	1997 U.S. CAR Revised Estimate for 2000	Actual Reductions to Date
Residential & Commercial Sector Actions		26.9	10.3	--
New	Rebuild America	2.0	1.6	--
1 and 2	Expanded Green Lights and Energy Star Buildings	3.6	3.3	--
3	State Revolving Fund for Public Buildings	1.1	Terminated	
4	Cost-Shared Demonstrations of Emerging Technologies	3.8	0.0	--
5	Operation and Maintenance Training for Commercial Building Facility Managers and Operators			
6	Energy Star Products	5.0	4.3	--
7	Residential Appliance Standards	6.8	0.2	--
8 and 11	Energy Partnerships for Affordable Housing	4.4	0.4	--
9	Cool Communities			
10	Update State Building Codes			
New	Construction of Energy-Efficient Commercial and Industrial Buildings		0.1	--
New	Superwindow Collaborative		0.0	--
New	Expand Markets for Next-Generation Lighting Products		0.2	--
New	Fuel Cells Initiative		0.0	--
Industrial Sector Actions		19.0	4.8	--
12	Motor Challenge	8.8	1.8	--
13	Industrial Golden Carrot Programs	2.9	Merged into Action 12 Terminated	
14	Accelerate the Adoption of Energy-Efficient Process Technologies			
15	Industrial Assessment Centers	0.5	CCAP Component Terminated	
16	Waste Minimization	4.2	2.1	--
17	Improve Efficiency of Fertilizer Nitrogen Use	2.7	0.8	--
18	Reduce the Use of Pesticides			
Transportation Sector Actions		8.1	5.3	--
19	Cash Value of Parking	6.6	4.6	--
20	Innovative Transportation Strategies			
21	Telecommuting Program			
22	Fuel Economy Labels for Tires	1.5	0.7	--
Energy Supply Actions		10.8	1.3	--
23	Increase Natural Gas Share of Energy Use Though Federal Regulatory Reform	2.2	Terminated	

Action Number	Action Title	1993 Action Plan Estimate for 2000	1997 U.S. CAR Revised Estimate for 2000	Actual Reductions to Date
24	Promote Seasonal Gas Use for Control of Nitrogen Oxides	2.8	0.5	--
25	High-Efficiency Gas Technologies	0.6	Terminated	
26	Renewable-Energy Commercialization	0.8	0.3	--
27	Expand Utility Integrated Resource Planning	1.4	Terminated	
28	Profitable Hydroelectric Efficiency Upgrades	2.0	0.0	--
29	Energy-Efficient Distribution Transformer Standards	0.8	0.5	--
30	Energy Star Distribution Transformers			
31	Transmission Pricing Reform	0.8	Terminated	
New	Green Power Network	Not included	0.0	--
Land-Use Change & Forestry Actions		10.0	2.4	--
43	Private Depletion of Nonindustrial Private Forests	4.0	Terminated	
44	Accelerate Tree Planting in Nonindustrial Private Forests	0.5	0.4	--
16	Waste Minimization	4.2	2.0	--
9	Expand Cool Communities	0.5	To be determined	
Methane Actions		16.3	15.5	--
32	Expand Natural Gas STAR	3.0	3.4	--
33	Increase Stringency of Landfill Rule	4.2	6.3	--
34	Landfill Methane Outreach Program	1.1	1.9	--
35	Coalbed Methane Outreach Program	2.2	2.6	--
36	RD&D for Coal Mine Methane	1.5	Terminated	
37	RD&D for Landfill Methane	1.0	Terminated	
38	AgSTAR Program	1.5	0.3	--
39	Ruminant Livestock Efficiency Program	1.8	1.0	--
Actions to Address Other Greenhouse Gases		16.3	25.4	--
17	Improved Fertilizer Management	4.5	5.3	--
40	Significant New Alternatives Program	5.0	6.4	--
41	HFC-23 Partnerships	5.0	5.0	--
42	Voluntary Aluminum Partnership	1.8	2.2	--
New	Environmental Stewardship Initiative	Not included	6.5	--
Foundation Actions			11.3	--
	Climate Wise	Not estimated	1.8	--
	Climate Challenge	Not estimated	7.6	--
	State and Local Outreach Programs	Not estimated	1.9	--
Total GHG Emission Reductions From CCAP		108.6	76.0	14.0

Data is not readily available for cumulative emissions reductions for many CCAP programs. Cumulative emissions reductions of about 5 MMTCE can be attributed to DOE's CCAP programs. EPA's Office of Air and Radiation is responsible for cumulative emissions reductions of about 9 MMTCE through their CCAP programs.

June 1997

GLOBAL WARMING

Information on the Results of Four of EPA's Voluntary Climate Change Programs



Resources, Community, and
Economic Development Division

B-276994

June 30, 1997

The Honorable Christopher S. Bond
Chairman, Subcommittee on VA, HUD,
and Independent Agencies
Committee on Appropriations
United States Senate

The Honorable Jerry Lewis
Chairman, Subcommittee on VA, HUD,
and Independent Agencies
Committee on Appropriations
House of Representatives

Increasing emissions of carbon dioxide, methane, and other heat-trapping greenhouse gases generated by human activity are believed to contribute to global warming. In an effort to reduce greenhouse gas emissions, the United States issued its Climate Change Action Plan (CCAP) in October 1993. The plan was designed to reduce greenhouse gas emissions primarily through voluntary efforts by companies, state and local governments, and other organizations. The Environmental Protection Agency (EPA) is responsible for 20 CCAP programs. The Department of Energy and other federal agencies are responsible for other CCAP programs.

Because of your concerns about the effectiveness of the climate change programs, you asked us to determine (1) what EPA has done to ensure that the greenhouse gas reductions it reports reflect only the results of its efforts, as opposed to other factors, and (2) whether EPA's projected reductions are consistent with experience to date. As agreed with your offices, we focused our review on four CCAP programs, which are designed to reduce emissions of various greenhouse gases through work with different kinds of organizations. These four programs account for about one-third of EPA's funding for CCAP.

Specifically, the Green Lights Program primarily encourages businesses and other organizations to install energy-efficient lighting in their buildings in order to reduce the use of electricity and the emission of carbon dioxide produced by generating electricity. The Coalbed Methane Outreach Program encourages coal mining companies to capture and use, as an energy source, methane that would otherwise be vented to the atmosphere. To reduce greenhouse gas emissions from manufacturing,

transporting, and disposing of materials, the Source Reduction and Recycling Program encourages businesses to reduce the amount of solid waste they generate and to increase the amount of waste they recycle. The State and Local Outreach Program helps state and local governments understand the sources of and possible solutions to global warming and also supports selected demonstration projects.

Results in Brief

For two of the four CCAP programs we reviewed, EPA adjusted the reductions in greenhouse gas emissions it had reported to account only for the effects of its efforts; for the other two programs, it did not adjust the reported reductions. Specifically, for the Coalbed Methane Outreach and Source Reduction and Recycling programs, EPA determined that nonprogram factors accounted for some of the reported reductions and, therefore, adjusted those reductions. For the Green Lights Program, EPA officials said that some reported reductions were probably the result of nonprogram factors, but they did not attempt to quantify the extent of the nonprogram factors because they believe it is not possible to do so. They said that any reductions resulting from nonprogram factors would likely be counterbalanced by reductions that they believe are attributable to the program but were not reported to EPA because the organizations did not participate in the program. Finally, for the State and Local Outreach Program, EPA did not attempt to determine whether some of the reported reductions resulted from nonprogram factors, although program officials said they tried to eliminate double-counting where reductions might be the result of other CCAP programs. EPA officials said they limited their efforts to quantify how much of the reported reductions resulted only from the effects of EPA's programs because it is difficult to make such an assessment, especially in the early stages of the programs' development.

EPA's projections of future reductions in greenhouse gases are not consistent with experience to date for three of the four programs but are consistent for the fourth program. For the Green Lights and Source Reduction and Recycling programs, the projected reductions are based on an assumption that the participants will, respectively, upgrade a larger proportion of their space and reduce waste at the source more in the future than they have thus far. For the State and Local Outreach Program, the projections assume that one key project will increase its impact, even though there are questions about the basis for the reductions reported thus far. Finally, for the Coalbed Methane Outreach Program, the projected reductions are consistent with experience to date.

Background

According to the Intergovernmental Panel on Climate Change, climate models project an increase in the earth's average surface temperature of between about two and six degrees Fahrenheit in the next century as a result of increasing emissions of greenhouse gases.¹ Furthermore, the panel reported in 1995, such increases could lead to floods, droughts, and other harmful changes in ecosystems. To address concerns about the possibility of global climate change, in May 1992 the United States and other countries signed the United Nations Framework Convention on Climate Change. As part of the Convention, the United States and other developed countries agreed to establish policies and measures with the aim of returning their greenhouse gas emissions to 1990 levels by 2000. In fulfilling its obligations under the Convention, the United States developed CCAP, whose goal is to reduce emissions by 109 million metric tons of carbon equivalent (MMTCE), from the projected 2000 level of 1,568 MMTCE to 1,459 MMTCE, slightly below the 1990 emissions level.²

EPA's 20 CCAP programs are generally designed to provide the information and tools to encourage the participants to voluntarily undertake changes that will reduce emissions of greenhouse gases whenever the changes make economic sense. Also, some programs are designed to overcome the institutional barriers that have traditionally prevented organizations from taking action.³ The Congress appropriated about \$86 million for EPA's CCAP programs for fiscal year 1997; EPA requested \$149 million for these programs in fiscal year 1998.

For this review, we selected four programs because (1) they are involved with different greenhouse gases and different kinds of organizations, (2) each accounts for a substantial proportion of EPA's CCAP funding, and

¹The panel was established in 1988 by the United Nations Environment Programme and the World Meteorological Organization to assess scientific and technical information about climatic change. See Working Group II Second Assessment Report: Summary for Policymakers: Impacts, Adaptation and Mitigation Options, Intergovernmental Panel on Climate Change, Working Group II, Technical Support Unit, Oct. 20, 1995. For additional information on the issue of global warming, see Global Warming: Difficulties Assessing Countries' Progress Stabilizing Emissions of Greenhouse Gases (GAO/RCED-96-188, Sept. 4, 1996).

²Greenhouse gases have varied effects on the atmosphere as measured by their global warming potentials. These global warming potentials are applied to emissions to arrive at a common measure for the greenhouse gases; the measure is expressed in million metric tons of carbon equivalent.

³According to a 1992 report by the Office of Technology Assessment, there are several reasons why energy-efficient technologies are not used more often in buildings. These reasons include the following: (1) There is often a separation between those who purchase energy-using equipment (for example, building owners) and those who pay to operate the equipment (building tenants). (2) Because energy costs are relatively low in comparison to total operating costs, those concerned with cost reduction often focus elsewhere. (3) Energy efficiency is often misperceived as requiring discomfort or sacrifice, limiting its appeal. See Building Energy Efficiency, ch. 3, Office of Technology Assessment (OTA-E-518, May 1992).

(3) each is credited by EPA as substantially reducing greenhouse gas emissions. Appendix I provides funding levels, the number of participants, and other information about each program.

The Green Lights Program is designed to encourage organizations to voluntarily adopt energy-efficient lighting technologies, such as compact fluorescent light bulbs and electronic ballasts. EPA provides information intended to encourage the adoption of these technologies. The Source Reduction and Recycling Program is designed to reduce the volume of solid waste produced and sent to landfills. Under the program's WasteWise element,⁴ EPA signs up businesses that agree to voluntarily decrease the amount of waste they generate and to increase the amount of waste they recycle. Under the program's Unit-Based Pricing element, local communities agree to charge residents for waste disposal on the basis of the amount of waste they generate.

The Coalbed Methane Outreach Program is designed to encourage coal mines and related industries to recover and use methane that would otherwise be emitted. The State and Local Outreach Program is a foundation program, designed primarily to raise awareness about climate change and provide technical support to state and local agencies and nonprofit organizations in analyzing and developing cost-effective response strategies, not to achieve short-term reductions in greenhouse gas emissions. The program also funds demonstration projects designed to test innovative strategies for reducing emissions and examine the impact of climate change on the states.

EPA establishes annual program targets for the programs, such as the volume of reductions in greenhouse gases (except for foundation programs, as noted above) and the number of participants. It tracks progress against these targets, relying primarily on reports from the programs' participants. However, EPA does not independently verify these reported reductions.

⁴EPA refers to it as WasteWi\$e.

Greenhouse Gas Reductions Reported by EPA Are Not Limited to Program Effects in Two of the Four CCAP Programs We Examined

Efforts to improve energy efficiency, increase recycling, and achieve related goals have been under way for years. These long-standing efforts make it difficult to measure the programs' "net" reductions—those that result only from CCAP programs—as compared with total, or "gross," reductions—those that result from CCAP programs as well as from other, nonprogram factors. EPA officials told us that measuring the net reductions that are strictly due to the results of CCAP efforts is difficult.⁵

Green Lights Program

According to EPA, 2,308 organizations were participating in the Green Lights Program as of February 1997. These organizations committed to upgrade the lighting in 6 billion square feet of floorspace, about 9 percent of the national total, according to EPA. Through fiscal year 1996, Green Lights participants reported upgrading the lighting in 1.3 billion square feet of floorspace, resulting in greenhouse gas reductions of 0.6 MMTCE. Although some of the reported reductions may be the result of influences from outside of the Green Lights Program, EPA did not attempt to measure the program's "net" benefits. Officials said that they believed that any reductions that resulted from other factors were likely offset by the reductions achieved by the nonparticipating organizations that were influenced by the program but not reported to EPA.

According to the representatives of seven former participants we spoke with, the program had a positive impact on these organizations' efforts to achieve energy savings from lighting technology. When we interviewed officials at these organizations that had completed their participation in the Green Lights Program, representatives of all seven said that they were pleased with the program. For example, some representatives said that they viewed the data provided by EPA on the benefits of specific lighting technologies as being valuable and objective.]

The reductions reported by EPA could be overstated if some Green Lights participants undertook at least some of their lighting upgrades because of nonprogram factors. Four factors suggest that some upgrades were made because of nonprogram factors.

First, according to a 1992 survey of commercial buildings, a substantial amount of floorspace was upgraded before the Green Lights Program was

⁵According to EPA officials, in a forthcoming report the administration will provide information on its estimates of the net greenhouse gas reductions resulting from the climate change programs. The report is scheduled to be issued in July 1997.

well established. The national survey of commercial buildings was conducted by the Department of Energy's Energy Information Administration (EIA).⁶ The survey found that 43 percent of commercial floorspace had lighting conservation features (such as occupancy sensors and time clocks) and that 22 percent of the floorspace had undergone an energy audit (which can identify opportunities for saving energy) in the previous 5 years.

Second, financial incentives that were available during the early to mid-1990s may have induced some organizations to install energy-efficient lighting. Officials of the Edison Electric Institute, an electric utility trade group, estimated that 80 to 90 percent of its members offered financial incentives during that time period to encourage their customers to install more energy-efficient lighting. By offsetting some of the costs of lighting upgrades, such assistance provides an incentive to adopt energy-efficient lighting. In fact, Green Lights participants reported to EPA that they had received \$143 million in such rebates through fiscal year 1996.

Third, some of the reductions attributed to the Green Lights Program were achieved by companies involved with lighting products, which could be expected to install energy-efficient lighting without the program. Of the 2,308 Green Lights participants, 593, or about one-quarter, were classified as "allies," that is, companies that manufacture, sell, and install lighting products. The reductions reported by these companies account for about 6 percent of the program's total. However, such companies could be expected to install energy-efficient lighting even without the Green Lights Program, given their knowledge of the benefits of this technology.

Finally, most of the representatives of organizations we spoke with about lighting upgrades, some of whom had participated and others who had not, told us that they would likely have made some of the upgrades without the program. When we spoke with the representatives of seven organizations that had completed their affiliation with the program, five of the seven stated that they would have done some or all of the upgrades without the program; the other two stated that they would not have done the upgrades without the program. In addition, we spoke with representatives of two major national corporations that did not participate in the program. Both companies told us that they had undertaken major lighting upgrades in the past few years without EPA's assistance.

⁶This survey was conducted shortly after the Green Lights Program was implemented. See *Commercial Building Characteristics 1992*, pp. 9-16, Energy Information Administration (DOE/EIA-0246(92), Apr. 1994).

Green Lights Program officials noted that they did not attempt to offset the reported reductions that may have been attributable to these other factors because they believe the program has offsetting impacts above and beyond the reductions reported by the participating organizations. For example, they noted several instances of nonparticipating companies that they believe undertook lighting actions as a result of information furnished by the Green Lights Program. However, they said they had not attempted to quantify the extent of the uncounted reductions by nonparticipants.

State and Local Outreach Program

According to EPA, 29 states and Puerto Rico have conducted inventories of their greenhouse gas emissions, 42 cities are developing action plans, and 7 demonstration projects have been selected for evaluation. Program officials said that although the program does not have a greenhouse gas reduction goal, it resulted in a reduction of 0.8 MMTCE in 1996.

Most of the reduction, about 0.7 MMTCE, was attributed to one demonstration project, called the Planet Protection Center. The main goal of this joint project between EPA and the approximately 46,000-member National Retail Hardware Association was to reduce residential energy use by promoting energy-efficient heating, lighting, and plumbing products. The participating retailers received materials to use in their stores to inform shoppers and salespeople, at the point of sale, about the benefits of buying energy-saving products. EPA officials said they initially estimated that 8 million households could reduce their energy consumption by an average of 10 percent because of the program. They said that to account for the possibility that market penetration might be less than 10 percent, as well as purchases that might have been made anyway, they halved the initial estimate.⁷ The result of these adjustments was an estimate that 8 million households did reduce their energy consumption by an average of 5 percent each.

Studies by an EPA contractor and the hardware association raised questions about the link between the program's activities and the reported reductions, as did our analysis of data in the hardware association's study. First, the EPA contractor that analyzed the data on the project's effects said that there was no concrete estimate of the project's impact because, among other reasons, of the difficulty of collecting sales data and a seeming lack of methods for reporting progress in greenhouse gas

⁷Although program officials said they adjusted the estimated reductions, in part, because some purchases might have been made without the program, we found no analytical basis for either the initial estimate or the adjustment to it.

emissions (which would result from reduced energy consumption).⁸ Second, the hardware association's 1995 study of the project's results found no overall difference in sales between the participating retailers and a control group of nonparticipants it surveyed, although it cautioned that the number of retailers responding was too small to be statistically significant.⁹ The study found that about one-third of the participating retailers who responded said they featured energy- and water-conserving products from time to time without the project. For this report, we analyzed certain data presented in the association's study, including sales data for 31 energy- and water-saving product lines. According to data from the responding retailers, sales at the nonparticipating retailers increased more than sales at the participating retailers for 17 of the product lines and less for the other 14 product lines.

Source Reduction and Recycling Program

Although the Source Reduction and Recycling Program has two elements—WasteWise and Unit-Based Pricing—EPA attributed virtually all of the program's results to WasteWise. According to EPA, 513 companies were participating in WasteWise as of March 1997. EPA reported reductions from WasteWise of 0.8 to 2.3 MMTCE in fiscal year 1995—the most recent year for which it calculated greenhouse gas reductions. As with energy efficiency measures, the trends over the past few years indicate a general movement toward increased recycling. Recognizing that recycling exists outside of the program, EPA asks the WasteWise participants to report separately on recycling associated with the program and general recycling efforts. EPA officials explained that they compile the participants' reports and check them for general reasonableness. However, they do not make any further adjustments.

When we spoke with seven WasteWise participants about their experience, six of them said they were pleased with the program, generally because they appreciated the free information provided on recycling and reducing wastes. While all six also said they were likely or somewhat likely to have made some of the improvements without the program, two said that they accelerated their actions because of the program. The seventh participant said his company was already taking all the steps recommended by the program.

⁸"Planet Protection Center Program: Presentation and Discussion of Emissions Reductions Results," ICF, Inc. (1996).

⁹Environmental Merchandising and Advertising/Promotion in the Retail Hardware/Home Improvement Industry, National Retail Hardware Association (Indianapolis, IN: Aug. 1995).

The range in estimated reductions attributable to the WasteWise element is largely the result of incomplete reporting by the participants. For fiscal year 1995, less than half of the WasteWise participants reported their program accomplishments to EPA. The low-end estimate (0.8 MMTCE) was based on the amounts reduced and recycled by the reporting participants. The high-end estimate (2.3 MMTCE) was based on program officials' judgments that (1) some of the nonreporting participants also reduced their wastes and recycled and (2) the nonreporting participants who reduced and recycled did as much, on average, as did the reporting participants.

Coalbed Methane Outreach Program

According to EPA, as of February 1997, 13 projects had been started under the Coalbed Methane Outreach Program. On the basis of the data on methane reported by the coal companies, EPA reported gross reductions of 2.7 MMTCE in 1996.

EPA officials estimated that 60 percent of the gross reductions were the result of nonprogram factors and that the program achieved net reductions of 1.1 MMTCE in 1996. The primary nonprogram factor is the Energy Policy Act of 1992, which helped remove a barrier to the capture of coalbed methane. EPA officials said they calculated the 60-percent factor by estimating the increase in the amount of methane captured as a result of their program over the amount that would have been captured as a result of the 1992 act without their program.

Specifically, certain provisions of the 1992 act were intended to deal with the possibility that adjacent landowners could contest the ownership of coalbed methane, which could discourage coal companies from capturing that methane. To help overcome this barrier, the act provided that the Department of the Interior would implement a program, in certain states, relating to those entities claiming an ownership interest in a particular unit of coalbed methane. Under the program, these entities would be required to arrange for an escrow account to be established and the proceeds from the sales of such coalbed methane would be placed into that account. Ultimately, the proceeds would be distributed after a final legal determination of ownership interest.¹⁰

In addition, program officials said that they claimed credit for the reductions in coalbed methane only if the coalbeds were being mined.

¹⁰Such programs were to be established in states that, among other things, have disputes about the ownership of coalbed methane and that do not have programs promoting the permitting, drilling, and production of coalbed methane.

Thus, the methane captured from wells drilled into coalbeds was not counted if the coal was not yet being mined. That methane could be counted later, when the coalbed was being actively mined.

Projected Greenhouse Gas Reductions Exceed Historical Results for Three of the Four CCAP Programs We Examined

EPA's projections of future greenhouse gas reductions depend on a number of assumptions, such as the number of participants, the extent to which these participants will act to decrease emissions, and the extent to which the reductions are linked to the program's efforts. As discussed in detail below, for the Green Lights and Source Reduction and Recycling Programs, the reductions projected for 2000 are based on a level of performance by the participating organizations that exceeds the programs' results to date. EPA officials said they believe that the performance of many programs will improve over time, in part because of their experience and because of better targeting of the programs.

For the State and Local Outreach Program, about one-half of the projected reductions of 1.7 MMTCE for 2000 are attributed to the Planet Protection Center project. In the previous section, we noted that there are questions about whether some of the project's reported greenhouse gas reductions were the result of nonprogram factors; such questions would also apply to its projected reductions. For the Coalbed Methane Outreach Program, the projected reductions are consistent with experience to date, and EPA continues to attribute about 60 percent of the gross reductions to the 1992 Energy Policy Act. Thus, the estimated gross reductions of 6.1 MMTCE in 2000 are reduced to net reductions of 2.6 MMTCE as a result of the program.

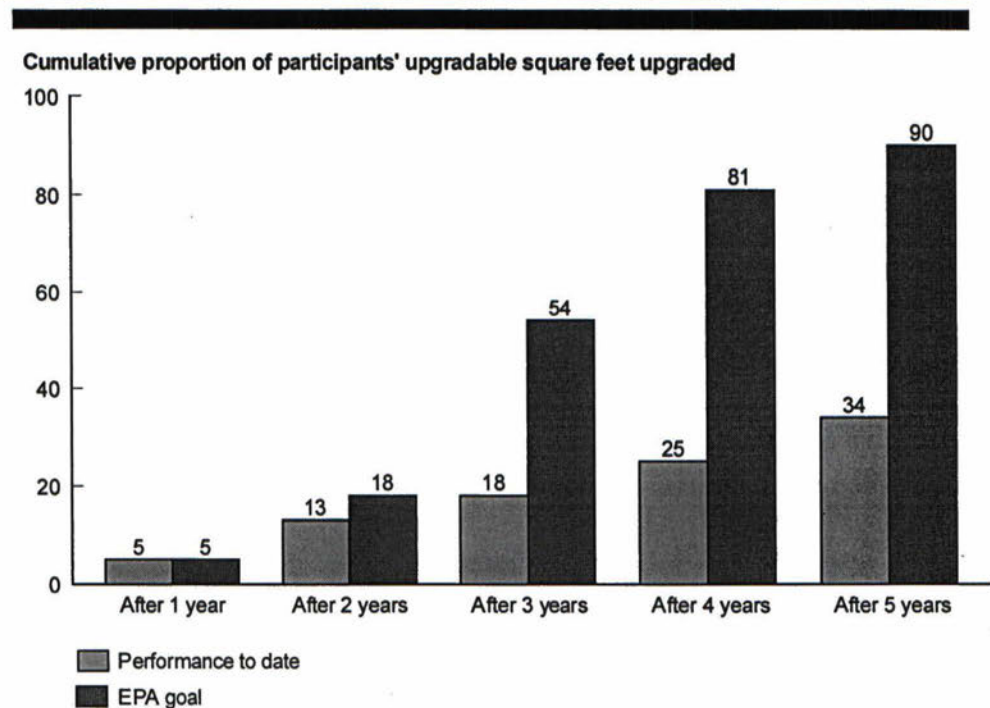
Green Lights Program

EPA estimates that the Green Lights Program will result in 3.9 MMTCE in annual greenhouse gas reductions in 2000; the estimate is based on several assumptions, including the amount of floorspace that will be upgraded with new lighting technology. When they join the Green Lights Program, the participants agree to survey the floorspace in all of their facilities and to upgrade 90 percent of the space which is considered upgradable and for which it is cost-effective to do so.

EPA established year-by-year goals, leading up to the 90-percent level after 5 years. For example, the goal is to upgrade 18 percent after 2 years and 54 percent after 3 years. In addition, EPA tracks the participants' accomplishments relative to these goals. According to EPA, the organizations that participated in the program for 5 years had upgraded

only 34 percent of their upgradable floor space within that time period. (See fig. 1.)

Figure 1: The Results of the Green Lights Program for the First 5 Years Were Below EPA's Goals



Source: EPA's data.

Program officials believe that in the future the participants will be able to achieve the 90-percent level because EPA has increased its level of support for the participants. For example, they are contacting participants more often to see if there is additional information that EPA can provide or if there are particular impediments that EPA can help them overcome. Program officials noted that the companies joining in 1995 exceeded the 18-percent goal established for upgrades through the second year of program participation. However, for participants joining in the 4 earlier years (1991-94), EPA's data show that the participants did not meet the 18-percent goal after participating for 2 years.

It may be difficult for EPA to achieve its Green Lights goals for two other reasons. The first reason relates to electricity prices. The Energy Information Administration projects that the average price of electricity will decline over the next 20 years by 0.6 percent per year after inflation, which would tend to make lighting investments less attractive. Moreover, the widespread discussion of deregulating electricity at the retail level, and the possible substantial cost decreases for larger users, create uncertainty about future electricity prices. An EPA program official noted that lighting investments are highly cost-effective and that any marginal decrease in electricity prices should make little difference to organizations that have joined the program. However, we note that decreasing or uncertain prices could make lighting investments appear less attractive to prospective Green Lights participants.

The second reason relates to possible "self-selection" bias among the initial Green Lights participants. In this context, self-selection is the likelihood that the organizations that voluntarily join a program may have been most likely to undertake those activities even if there were no program. Self-selection bias is a concern in evaluating the effectiveness of voluntary energy-efficiency programs, according to a paper on evaluating such programs.¹¹ To the extent that the organizations most likely to upgrade were the ones that joined the program initially, it may be difficult for EPA to continue to recruit large numbers of organizations into the program. However, EPA officials said they believe that a continued education campaign, coupled with successful upgrades by businesses, will make recruitment easier.

Source Reduction and Recycling Program

EPA estimated that the program's WasteWise and Unit-Based Pricing elements would both achieve substantial reductions in 2000. For WasteWise, the reductions were estimated to range from 1.9 to 6.7 MMTCE. The lower estimate is based on the assumptions that a higher proportion of participants will reduce waste at the source and recycle in the future and that their average levels of source reduction will increase. Specifically, EPA assumes that the proportion of WasteWise participants that reduce waste will increase from 40 percent in 1995 to 90 percent in 2000 and that the proportion that recycle will increase from 75 percent in 1995 to 90 percent in 2000. Moreover, EPA assumes that the amount of waste reduced per participant will increase by 50 percent between 1995 and 2000. The higher level (6.7 MMTCE—more than three times the lower level)

¹¹Gretchen B. Jordan and Darrell A. Beschen, "Planning for Evaluation of the U.S. Department of Energy's Energy Partnership/Climate Change Programs," presented at the 1995 International Energy Program Evaluation Conference, Chicago, IL (Aug. 1995).

is based on additional assumptions designed to adjust for the reductions that EPA believes were underreported in 1995.

For Unit-Based Pricing, EPA estimated in 1995 that it would achieve reductions of 2.2 MMTCE in greenhouse gases in 2000. This projected level was based on an assumption that 575 communities would adopt a unit-based pricing approach to waste disposal each year. However, EPA program officials later found that only 72 communities adopted unit-based pricing in 1995. Program officials believe that the lower results for 1995 were the result of underestimating the time needed for the communities to implement unit-based pricing. The officials said that they now have the tools to promote a much greater adoption of unit-based pricing and that enrollments in 1996 and 1997 increased substantially.

Agency Comments

We provided copies of a draft of this report to EPA for review and comment. We received responses from three EPA offices. We received a letter from the Director, Office of Atmospheric Programs, Office of Air and Radiation, whose office manages the Green Lights and Coalbed Methane Outreach programs. (App. II contains the complete text of his letter, along with our detailed responses.) We also obtained comments from the Director, Climate Policy and Programs Division, Office of Policy and Program Evaluation; and the Director, Municipal and Industrial Solid Waste Division, Office of Solid Waste and Emergency Response. The former office manages the State and Local Outreach Program, and both offices are involved in the Source Reduction and Recycling Program.

The Director, Office of Atmospheric Programs, discussed the difficulties of evaluating the effects of voluntary programs. Also, he said that the draft report inaccurately used EIA's survey data to suggest that EPA overstated the reductions achieved by the Green Lights Program. We believe that we used these data fairly. We cited them to demonstrate that some companies with commercial office space had undertaken energy audits and installed energy-efficient lighting by 1992, when the Green Lights Program was just beginning. We believe that the factors that induced companies to take such actions before 1992 would likely have continued beyond 1992 and may, in part, account for some companies' decisions to join the Green Lights Program and to undertake upgrades. However, as noted in the report, EPA's reported reductions did not account for nonprogram factors that may have induced Green Lights participants to undertake upgrades.

The Director, Office of Atmospheric Programs, also stated that the climate-change programs are improving over time and that he does not believe that the projected reductions are optimistic. We noted that the projections are not consistent with experience to date. It is possible that, with the improvements he mentioned, the programs could meet their goals for 2000.

The Director, Climate Policy and Programs Division, objected to our including the State and Local Outreach Program in this review because it is considered a foundation program. That is, the program is not primarily intended to achieve reductions in greenhouse gas emissions. Rather, it is intended, among other things, to motivate state and local officials to understand the rationale behind taking actions to reduce emissions. As noted in the report, we included the program because, according to EPA's data, it was responsible for substantial reductions in greenhouse gas emissions in 1996 and is projected to achieve even more substantial reductions in 2000.

The Director, Municipal and Solid Waste Division, as well as the other two directors who commented on the report, provided updated data and technical corrections, which we incorporated in the report as appropriate.

We conducted our review from September 1996 through June 1997 in accordance with generally accepted government auditing standards. See appendix III for the details of our scope and methodology.

As arranged with your offices, we plan no further distribution of this report until 15 days after the date of this letter unless you publicly announce the report's contents earlier. At that time, we will send copies to the appropriate congressional committees and the Administrator of EPA. We will also make copies available to others upon request. If you have any questions or need additional information, please call me at (202) 512-6111. Major contributors to this report are listed in appendix IV.

A handwritten signature in black ink, appearing to read 'P. F. Guerrero', with a stylized, sweeping flourish extending to the right.

Peter F. Guerrero
Director, Environmental Protection
Issues

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INDUSTRY INCENTIVES FOR ENVIRONMENTAL IMPROVEMENT

Combined Executive Summary

for

Three Reports

Submitted to the

IDEA 21 Work Group of the

Global Environmental Management Initiative

(GEMI)

- *Industry Incentives for Environmental Improvement: Evaluation of U.S. Federal Initiatives*
by Terry Davies and Jan Mazurek
- *Corporate Environmental, Health and Safety Practices in Transition: Management System Responses to Changing Public Expectations, Regulatory Requirements and Incentives*
by Terry F. Yosie and Timothy D. Herbst
- *Incentives for Environmental Improvement: An Assessment of Selected Innovative Programs in the States and Europe*
by Daniel P. Beardsley

The GEMI organization manages critical thinking about key environmental, health and safety issues. GEMI's Work Group, *Incentives, Disincentives, Environmental Performance and Accountability for the 21st Century*, (*IDEA 21*), recently sponsored three independent research projects to better define and characterize incentives leading to improved environmental performance by business. GEMI supports and encourages full stakeholder review and consideration of these analyses. Without endorsing the analyses or advocating any particular set of actions, GEMI wants to provide the "spark" and energy that leads to discussions of environmental, health and safety issues.

GEMI commissioned these studies to provide the basis for further discussions with EH&S thought leaders. GEMI will make these studies available to other groups to use in developing models for the future. To this end, the *IDEA 21* Work Group has invited 20 or so top EH&S professionals to a two-day workshop later in October to discuss the results of the studies. In keeping with its non-profit status, GEMI will not engage in advocacy. However, the environmental community and other multi-stakeholder groups have asked for information and ideas from the business community about incentive-based programs. The studies and the workshop are designed to provide this information.

The three reports provide the following conclusions about future use of incentives:

- Key stakeholders need to agree on clear, specific, measurable environmental objectives.
- Given agreement on performance objectives, entities responsible for implementation should have the freedom to design plans that take advantage of pollution prevention, process modification, and other innovative alternatives to mandated end-of-pipe controls.
- Clear procedures should be established for open stakeholder participation in the design and implementation of programs. At the same time, these processes need to be linked to the achievement of program objectives.
- Incentives for participation in programs of this kind need to be *tangible and significant*. At a minimum, they should offer reduced transaction costs, such as less duplicative reporting requirements and quicker permitting. To be more attractive, programs should provide direct economic incentives to mitigate the future costs of pollution control.

GEMI's premise is that well-structured incentive programs can be very effective in advancing environmental objectives while improving pollution control efficiency for the private sector. GEMI also believes that incentive-based programs show tremendous promise for further advances in environmental performance and total quality environmental management in corporate programs. Results from the studies (which reached remarkably similar conclusions) do not prove that the current array of federal incentive programs support the GEMI premise. However, the studies do not dispute the GEMI *concept* that incentive approaches offer tremendous future promise. Most federal programs are relatively new, are still being refined, and need more systematic evaluation. The experience of state and European efforts to date is more positive. This information about cooperative and flexible incentive-based programs will provide important ideas and information to the many discussions about environmental regulation taking place outside of GEMI.

Combined Executive Summary

A. Introduction

In April, 1996, the Global Environmental Management Initiative (GEMI)* sponsored three independent, related studies. This document is a combined executive summary for all three, although this booklet contains only one of the three reports. The combined summary was produced because the three researchers found many common conclusions in their reports. It also alerts the reader to the other reports in the series. The three reports are:

- Industry Incentives for Environmental Improvement: Evaluation of U.S. Federal Initiatives by Terry Davies and Jan Mazurek
- Corporate Environmental, Health and Safety Practices in Transition: Management System Responses to Changing Public Expectations, Regulatory Requirements and Incentives by Terry F. Yosie and Timothy D. Herbst
- Incentives for Environmental Improvement: An Assessment of Selected Innovative Programs in the States and Europe by Daniel P. Beardsley

One report examined corporate attitudes about the environment, changes in environmental behavior, and corporate responses to incentive-based health and safety programs. Another report reviewed five major environmental and safety programs managed at the federal level of the United States (Project XL, the Common Sense Initiative, the sulphur dioxide emissions trading program, the OSHA STAR program, and the 33/50 Program). The final report assessed selected new environmental programs in Western Europe (the Netherlands, Sweden, and the United Kingdom) and programs managed by American states (Minnesota, New Jersey, Massachusetts, and Colorado).

GEMI had several purposes in funding this research:

- to identify incentives which seem most promising in terms of encouraging the private sector to get to the "next level" of environmental protection. To achieve this aim, incentives would have to be strong enough to influence corporate behavior and would have to lead to measurable environmental benefits.
- to determine the extent to which recent innovative programs launched by the federal government, the states, and European countries have demonstrated the utility of incentive-based programs; and
- to make available findings of this research to appropriate decision makers.

* GEMI is a not for profit organization of 21 leading corporations dedicated to helping business achieve environmental, health and safety excellence.

GEMI's premise is that well-structured incentive programs can be very effective in advancing environmental objectives and making pollution control more efficient for the private sector. GEMI also believes that incentive-based programs have tremendous promise for advancing continuous improvement and total quality environmental management in corporate programs. Results from the studies (which came to remarkably similar conclusions) do not prove that the current array of Federal incentive programs support the GEMI premise. Neither do the studies dispute the GEMI *concept* that incentive approaches offer tremendous future promise. Most Federal programs are relatively new, still being refined, and in need of more systematic evaluation. The experience of state and European efforts to date is more positive. This up to date information about cooperative and flexible incentive-based programs will inform the many discussions about environmental regulation taking place outside of GEMI.

The three studies were undertaken during a five-month period. This document summarizes the findings of those three studies. Relatively little quantitative data exists which documents either explicit economic or other benefits of voluntary programs to the private sector or environmental accomplishments—due in large part to the recent initiation of the environmental programs reviewed, though also to the limited public and private commitment to program evaluation. Researchers relied on data that was available as well as extensive literature reviews and interviews with program designers and participants.

B. Findings

This paper summarizes the findings of all three reports using the following format: 1) factors which appear crucial to voluntary program success or failure; 2) conclusions about the future use of incentives; and 3) other conclusions.

1. Factors in Program Success or Failure

Programs that either *are* working well (such as the Dutch covenants, Sweden's permitting program, and the New Jersey pollution prevention/facility-wide permit project) or *appear* to be successful thus far (Minnesota's programs, the Integrated Inspection Program and Printers' Project in Massachusetts, the Integrated Pollution Control program in the United Kingdom; at the federal level, at least to some extent: OSHA's Star Program and EPA's 33/50 and SO₂ trading programs) share some common features. Successful programs have objectives that are relatively simple and clear both to government and business and enable participants to have a major voice in the establishment of goals. All these programs grant significant flexibility to business to engineer the means for implementing program objectives. In apparent recognition of the environmental sophistication of industry now, compared to 25 years ago, these programs mandate performance goals rather than technology. A third common element in successful programs is trust among the participants and stakeholders. Literally every interviewee in the European programs, the New Jersey program, and designers of the Minnesota programs noted the importance of the mutual respect and cooperative spirit shared by participants in program development; interviewees from these and other programs also saw important benefits in improved relationships with

regulatory agencies. The evidence is mixed as to whether these innovative programs are sacrificing strong enforcement, particularly in the case of federal initiatives.

Several other, more specific considerations should be noted about successful programs. To the extent "success" is defined in environmental terms, it should be measured. Evidence exists from both third-party evaluators and interviewees that New Jersey's program contains environmental benefits; indicative data is also noted to support the benefits of the United Kingdom and Dutch programs. From the industry perspective, these and related programs work because the incentives for industry to participate were clear and substantive: participants see economic benefits (reduced transaction costs), competitiveness advantages (faster time-to-market), and, in the case of 33/50, the flexibility to choose the means to achieve reductions. Finally, it is perhaps important that almost every successful state program was supported by state legislation.

Less successful programs also share common features. Some are the reverse of positive factors noted above: lack of clear, shared program objectives between government and business (and even between levels of government—many states seem to believe that XL is about *alternative compliance* while EPA insists facilities must go *beyond compliance*); over-control by government in establishing program objectives, combined with pervasive mistrust among the participants; uncertainty about either business or environmental benefits of the program; and absence of a statutory base. This latter feature deserves particular attention.

The lack of a statutory basis for environmental initiatives or programs always foreshadows difficulty. Because of congressional, court, public interest, and other pressures, civil servants tend to spend their time—rightly—on programs grounded in law; other initiatives have lower priority. Also, without a legal mandate, decisions must be made by some sort of consensus, which is rarely efficient or effective in an atmosphere as contentious as environmental management. The lack of a statutory base can be ameliorated by clear objectives, maximum participation in developing those objectives to ensure buy-in and flexible implementation tailored to the self-interest of the participants. Absent these process commitments, non-statutory programs almost always fail.

Business participants note another major problem with the CSI and XL programs. The incentives for program involvement are weak to begin with, and risks of litigation and other failures are high. Against this backdrop, companies are increasingly discouraged by the unexpectedly high transaction costs of participation. Investment of staff time can be enormous. There is frustration over the length of the project review process and confusion over the role of stakeholders; facilities receive conflicting signals from different levels of EPA staff, and EHS staff are having difficulty convincing other corporate executives of the tangible benefits of the programs. Costs of participation, in other words, are beginning to outweigh incentives.

2. Conclusions About Future Use of Incentives

The following principles should guide the use of incentives in future voluntary programs:

- Key stakeholders need to agree on clear, specific, measurable environmental objectives.
- Given agreement on performance objectives, entities responsible for implementation should have the freedom to design plans that take advantage of pollution prevention, process modification, and other innovative alternatives to mandated end-of-pipe controls.
- Clear procedures should be established for open stakeholder participation in the design and implementation of programs. At the same time, these processes need to be linked to the achievement of program objectives.
- Incentives for participation in programs of this kind need to be *tangible and significant*. At a minimum, they should offer reduced transaction costs, such as less duplicative reporting requirements or quicker permitting. To be more attractive, programs will provide direct economic incentives which mitigate the future costs of pollution control.

For business, however, incentive-based programs must also be leveraged with other major drivers of corporate environmental performance. These include: performance-based management goals; cost-reduction objectives; industry sector characteristics; and reputation value.

3. Other Conclusions

Regarding the federal voluntary or incentive-based programs studied in this report, we cannot show that these programs have made a major contribution to either environmental improvement or to lowering the cost of the pollution control system. The sulphur dioxide emissions trading program--different in kind from the other four analyzed--may be an exception to this in mitigating costs for participating companies.

This is not to say that the *concepts* undergirding these programs are flawed. Companies welcome economic incentives and they are willing to exchange these benefits for greater commitments to environmental protection. Despite the cynical expectation, private sector support for incentive programs is not only economic: many of those interviewed believe that well-designed incentive programs are more beneficial for the environment. The problem for current federal programs seems to be in the need for better implementation: broader stakeholder participation in program design; clearer incentives and environmental protection objectives; a shared sense of purpose among federal, regional, and state government officials; and, probably, in the need for a statutory base.

The record of new state (and European) programs, though still uncertain given how recently these initiatives have been started, is more positive. States have been more effective in making facility managers feel involved in design and implementation. Trust and cooperation between government and the private sector is much higher in the state programs. Companies identify clear existing or potential benefits, mostly economic, but others as well. Where data exists, as in New Jersey and the United Kingdom, it suggests that measurable environmental benefits can be gained from properly structured incentive programs. The more successful programs are supported by legislation.

A likely shortcoming of the state programs, and the federal initiatives as well, is that both environmental and economic achievements will turn out to be marginal. As these experimental programs continue and are improved, consideration should be given to simply making them bolder--environmental objectives need to be made clearer and more measurable, and existing incentives for participation should be made more significant.

EXECUTIVE SUMMARY

This report evaluates new or existing business/government initiatives in the United States at the federal level. Primarily, we attempt to identify the elements of the program which would cause business to behave in a manner different from that required under a traditional command and control approach.

Five federal programs were selected for evaluation: the OSHA Star program and four EPA initiatives: the 33-50 program, Common Sense Initiative (CSI), Project XL, and SO₂ emissions trading. These programs represent the most prominent current efforts to motivate environmental improvement by business firms outside of the command-and-control framework.

The most important conclusion about the federal programs examined is that four of the five programs (SO₂ emissions trading is different in almost every way from the other four programs) are peripheral, both to business and society. They do not address most of the important problems with the pollution control system nor do they appear to contribute significantly to improving environmental quality or safety.

OSHA Star and the programs related to it have succeeded in establishing a positive image, but it is very debatable whether the programs have made any major contribution to occupational safety and health. XL and CSI may be too new to evaluate with any certainty, but there is no indication that either program will make a major contribution to environmental improvement or to lowering the cost of the pollution control system. 33/50 is quite different from XL and CSI in that the transactions costs of participating were close to zero. The minimal threshold for participation and the looseness of the criteria for success make it difficult to know how much impact 33/50 had.

In terms of their attractiveness to business, our review of the initiatives shows that there is no single incentive that appeals to all businesses. In fact, it is difficult to find a voluntary federal initiative that appeals to business at all. The emissions trading program is an exception, since it is required by law and participation clearly saves firms a significant amount of money. Our analysis of participation rates under the four voluntary federal programs studied show that the initiatives tend to attract very few businesses.

Of the four initiatives, 33/50 has attracted the most participants, followed by OSHA Star. Of the 8,000 manufacturers invited by EPA to join 33/50, about 14 percent signed on. There are about 98 companies with 231 work sites enrolled in OSHA's VPP program. Only ten facilities of extremely large U.S. market-leaders are implementing XL project plans. About 20 companies participate in CSI.

Table ES-1 shows that the different federal initiatives tend to feature different types of business incentives. Incentives depend in part on the goals of the program and types of firms that are targeted.

enviros, EPA, the states, Congress—often question the motives of the other elements and think that these other elements have a major advantage in whatever battles take place.

Environmental groups had misgivings about 33/50 because of the lack of any controls, and some groups argued for third-party audits to check on the results achieved by facilities. The program illustrates a fundamental conflict between the business community's desire for flexibility and simplicity and the environmental community's desire for certainty and enforceability.

Given the lack of consensus, if the badly broken pollution control system is to be mended it will have to be done through some problem-solving negotiating mechanism. It so happens that the Founding Fathers in their great wisdom provided just such a mechanism in the form of the U.S. legislative system. A basic conclusion to be drawn from our look at the administrative attempts at reform is that there is no short-cut, no way around the difficult task of trying to legislate a better system.

CHAPTER 1. OVERVIEW OF BUSINESS INCENTIVES

Theories of Incentives

Federal policy makers have several types of potential instruments at their disposal to promote corporate environmental excellence. Potential incentives include market-based strategies, such as emissions trading schemes, as well as voluntary programs that recognize and reward superior environmental performance.

While there is a rich literature that examines the relationship between business and laws designed to improve environmental health and safety, there are few theories and fewer quantitative studies which illustrate what incentives work best. Our literature search shows that most research on business incentives focuses not on the relationship between firms and federal regulators, but on how firms respond to other factors such as consumer demand, interest group pressure, and media attention.

In general, there exist three, distinct theoretical traditions on the role between business and federal health and environmental laws. These include what observers refer to as the "traditional" economic approach, the "revisionist" approach, and a more recent school of thought developed primarily by business, for business. The five initiatives examined below variously draw from these different groups of thought and research. Before discussing the performance of the five initiatives covered in this study, we will briefly review the three distinct sets of reports and findings that deal with incentives to industry.

The oldest and most data-rich of the three schools of thought on incentives comes from what is known as the "traditional approach."¹ Developed around 1960 -- roughly the same time as federal environmental laws and regulations were expanding -- the traditional environmental economic approach is premised on the idea that firms release pollution into the environment when pollution sources lack proper market signals. As the theory goes, laws that tell polluters how to reduce pollution tend to raise costs and lower productivity because firms, not government, know best how to control processes inside a plant.²

Environmental economists have conducted a number of studies on different industries which tend to reinforce the idea that command and control laws tend to raise manufacturing costs and lower productivity.³ Based on theory and extensive research, traditionalists conclude that the

¹ For a comprehensive review of this literature, see Jaffe, Adam B., Steven R. Peterson, Paul R. Portney and Robert N. Stavins. 1995. "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature*. Vol. 30. pp. 132-163.

² Cropper, Maureen L. and Wallace E. Oates. 1992. "Environmental Economics: A Survey," *Journal of Economic Literature*. Vol. 30. pp. 675-740.

³ See, for example Darbera, Anthony J. and Virginia McConnell. 1990. "The Impact of Environmental Regulations on Industry Productivity: Direct and Indirect Effects." *Journal of Environ. Econ. Manage.*, Jan. 1990, 18(1), pp. 50-65. Gray, Wayne B. and Ronald J. Shadbegian, 1994. "Pollution Abatement Costs, Regulation, and Plant-Level Productivity." National Bureau of Economic Research, Cambridge, MA.

most effective and efficient way to improve environmental performance is to develop policies that harness market forces and let polluting firms decide how best to curb pollution.⁴

While the traditionalist school has endorsed the development of market-based incentives for several decades, most market-based initiatives are quite recent in origin. While they vary in scope and design, most market-based efforts encourage industries to trade emissions credits. Firms that are able to control pollution cost effectively sell credits to other companies that find control less cost effective. The sulfur dioxide allowance trading program, which targets utilities regulated under the Clean Air Act, is perhaps the most prominent of such initiatives and is examined in greater detail later in this report.

Recently, a small group of scholars has begun to revise the traditional economic approach in order to examine what effects environmental regulations have on the competitiveness of U.S. firms.⁵ This "revisionist" group, associated with Harvard professor, Michael Porter, conclude that companies can use environmental requirements to gain market advantage over competitors. While intuitively appealing, the Porter hypothesis, for the most part, is yet to be supported with much empirical evidence. One recent review of the literature in this area concludes that both the purported positive and negative effects of environmental regulation on competitiveness were difficult to detect.⁶ Despite the dearth of evidence to either support or refute Porter's hypothesis, some have nonetheless embraced his assertion that regulations can promote both economic growth and cleaner production.⁷ The Common Sense Initiative (CSI), a recent EPA effort to promote "cleaner, cheaper" production through regulatory reform, is motivated, in part by revisionist assumptions. We examine CSI in greater detail below.

The third major strand of literature, perhaps most relevant to this study, is rooted more squarely in business traditions. Comprised of articles penned either by business leaders or industry consultants, the central premise of the business literature is that industry best understands what drivers are most appropriate.⁸ In this regard, it is not inconsistent with traditionalist tenets. However, few business experts believe that firms operate according to the elegant theories advanced in college economics classes. There also are often strains of Porter's ideas in the

⁴ See, for example Barbera, Anthony J. and Virginia McConnell. 1990. "The Impact of Environmental Regulations on Industry Productivity: Direct and Indirect Effects." *Journal of Environ. Econ. Manage.*, Jan. 1990, 18(1), pp. 50-65. Gray, Wayne B. and Ronald J. Shadbegian, 1994. "Pollution Abatement Costs, Regulation, and Plant-Level Productivity." National Bureau of Economic Research, Cambridge, MA.

⁵ Porter, Michael E. 1990. *The Competitive Advantage of Nations*. New York: Free Press. See also, "America's Green Strategy," 1991. *Scientific American*. Apr. p. 168.

⁶ For a comprehensive review of this literature, see Jaffe, Adam B., Steven R. Peterson, Paul R. Portney and Robert N. Stavins. 1995. "Environmental Regulation and the Competitiveness of U.S. Manufacturing: What Does the Evidence Tell Us?" *Journal of Economic Literature*. Vol. 30. pp. 132-163.

⁷ Jaffe, et. al. op. cit. p. 157.

⁸ See, for example, "Corporate Environmentalism" 1992. *Columbia Journal of World Business*. Vol. 27. Nos. 3 and 4; Smart, Bruce. 1992. *Beyond Compliance: A New Industry View of the Environment*. Washington, D.C.: World Resources Institute; *The Greening of Environmental Business: Making Bottom-Line Sense of Environmental Responsibility*. Thomas F. P. Sullivan, ed. Rockville, MD: Government Institutes; *Changing Course: A Global Business Perspective on Development and the Environment*. 1992. Stephan Schmidheiny with the Business Council for Sustainable Development. Cambridge, MA: The MIT Press; Elkington, John and Tom Burke. 1987. *The Green Capitalists: Industry's Search for Environmental Excellence*. London: Victor Gollancz Ltd.

business literature as well: some environmental leaders say that good environmental practice is good for business.

According to the business literature, incentives to business should recognize and reward voluntary business efforts to deliver environmental performance superior to requirements set out under existing laws and regulations. The U.S. Environmental Protection Agency's 33/50 program and the Star program advanced by the Occupational Safety and Health Administration (OSHA), follow these tenets and are examined in greater detail below.

While it most closely reflects real-world business practices, the business literature is the least theoretical of the three. The business findings also are supported by the least quantitative data. Most accounts of what drive industry to deliver superior results are anecdotal and derived either from roundtable discussions, expert panels, or non-scientific surveys. One reason so little quantitative data exists to support these assertions may stem from the fact that it is not in a firm's interest to release data that potentially may fall into the hands of competitors or generate adverse publicity. Often firms do not collect data that would be relevant to assessing incentives or collect it in a way that makes comparisons impossible.

There is evidence that some scholars are starting to fill the business data void. One example is a recent study in the business literature that attempts to identify what determines how companies respond to public expectations on natural environmental issues.⁹ While the focus of the research differs slightly from the question of what incentives the federal government can use to better target business, the results nonetheless appear to support influential, qualitative studies in the business literature.

Researchers surveyed medium-sized U.S. steel and semiconductor manufacturing facilities and then subjected the results to expert review. To secure the data, participating firms were promised anonymity. Overall, the researchers found that the "legitimacy" of environmental concerns is the most important incentive for firms that have proactive environmental strategies. In other words, managers must perceive societal expectations concerning the environment as justifiable. Cooperation and trust with regulatory agencies were other factors that distinguished proactive firms. The study also found that, in almost all cases, corporate environmental leaders are led by a top executive who is clearly committed to environmental issues. While the study does not make policy recommendations, the findings suggest that initiatives which build trust between companies and federal regulators may appeal to some businesses.

The recent business findings are consistent with other research that contrasts the U.S. environmental system with that of other industrialized countries.¹⁰ The research based on international comparisons suggests that the U.S. system of laws and administrative procedure tends to place industry and regulators at odds.

Due in part to the inherently litigious and time-consuming nature of the present system reflected in the writings on business, some conclude that reform is simply not possible under the

⁹ Judge, William Q. Alex Miller and Don Fowler. 1996. "What Causes Corporate Environmental Responsiveness." *Corporate Environmental Strategy*. Vol. 3. No. 3. pp. 42-48.

¹⁰ Wallace, David. 1996. *Environmental Policy and Industrial Innovation: Strategies in Europe, the U.S. and Japan*. The Royal Institute of International Affairs. London: Earthscan Publications Ltd.

2. 33/50 PROGRAM

Program Description

EPA's 33/50 Program is a voluntary pollution prevention initiative that began in the late 1980s. The Program was an outgrowth of several events. In 1989, EPA formed its first voluntary pollution reduction agreement with nine "ATERIS" (Air Toxics Emissions Reductions Inventory System) companies to reduce 83 percent of their toxic air emissions by 1993.¹ This agreement was made between then-Administrator William K. Reilly and the ATERIS chief executive officers in an experiment to test the potential for using voluntary agreements to pollution control.

The following year, the Science Advisory Board's report, *Reducing Risk: Setting Priorities and Strategies for Environmental Protection* emphasized the threat of toxic chemicals and stressed the need for source reduction as the preferred method to reduce public risk, directing EPA's attention towards reducing toxics.² During the same month, the Pollution Prevention Act of 1990 was passed. It emphasized reducing the quantity of hazardous substances, pollutants, or contaminants from entering a waste stream or being released into the environment prior to recycling, treatment, or disposal. The legislation focused on methods for reducing waste at its source and otherwise preventing the creation of pollution, rather than on controlling or treating emissions.

In response to the increased focus on pollution reduction, EPA launched the 33/50 Program which sought voluntary cooperation from industrial firms to significantly cut toxic chemicals in releases and transfers primarily through source reduction. The Program used EPA's Toxic Release Inventory (TRI) to monitor participating firm releases and the program's progress. The TRI is the accumulation of facility-reported information describing their releases to air, water, and land of some 450 chemicals.³ Although the TRI covers only a small number of facilities and pollutants, it is nevertheless the most comprehensive collection of firm-specific pollution emissions data available. The Program's baseline year for comparison was 1988.

The Program monitored the emissions of 17 toxic chemicals which are listed Table 2-1. The chemicals were selected primarily because of their threat to the environment and public health, potential for high exposure, volume of production and release, and potential for pollution reduction and prevention. These chemicals represented the most widely released and most toxic chemicals in the TRI. During 1988, 1.49 billion pounds of the 17 target chemicals were either released to the environment on-site or transferred off-site to waste management facilities.⁴ Combined, they comprised about one-fourth of the total TRI releases and transfers in 1988.

¹ INFORM. *Toxics Watch 1995*, INFORM: New York (1995).

² Environmental Protection Agency. *Reducing Risk: Setting Priorities and Strategies for Environmental Protection*, report of the Science Advisory Board: Relative Risk Reduction Strategies Committee to William K. Reilly, (9/90, SAB-EC-90-021)

³ EPA has expanded the list each year since 1987. In 1988, the baseline year for 33/50, the TRI accounted for the releases and transfers of about 320 toxic chemicals.

⁴ Environmental Protection Agency. *1994 Toxic Release Inventory, Public Data Release*, Office of Pollution Prevention and Toxics (June 1996 EPA/745-R-002).

Table 2-1: 33/50 Program Chemicals⁵

1. Benzene	10. Mercury and mercury compounds
2. Cadmium and cadmium compounds	11. Methyl isobutyl ketone
3. Carbon tetrachloride	12. Nickel and nickel compounds
4. Chloroform	13. Tetrachloroethylene
5. Chromium and chromium compounds	14. Toluene
6. Cyanide compounds	15. 1,1,1-Trichloroethane
7. Dichloromethane	16. Trichloroethylene
8. Lead and lead compounds	17. Xylenes
9. Methyl ethyl ketone	

A secondary reason that EPA selected these chemicals was that they represent mostly airborne releases and are regulated by the Clean Air Act Amendments (CAAA). Companies that chose to participate in the 33/50 program would be eligible for the Early Emissions Reduction provision of the CAAA.⁶ The provision gives firms additional time to comply with applicable emissions standards if they significantly reduce their emissions before the standards are proposed.

EPA formally announced the 33/50 Program in February 1991. The Program had 3 goals, as seen in Table 2-2. The first goal was a 33 percent reduction (491 million pounds) in releases and transfers of 17 toxic chemicals by 1992. The Program's second aim was a 50 percent reduction (744 million pounds) of releases by 1995. Finally, the Program sought to demonstrate that voluntary reduction programs could achieve targeted reductions faster than could be done by EPA's traditional regulatory approach alone.⁷ The 33/50 Program's name derives from its first two goals.

Table 2-2: Goals of the 33/50 Program⁸

Goal Type	Operationalized Goal
• Interim reduction goal	• Reduce 17 TRI pollutants by 33 percent (491 million pounds) by 1992.
• Ultimate reduction goal	• Reduce 17 TRI pollutants by 50 percent (744 million pounds) by 1995.
• General goal	• Show that voluntary pollution reduction programs work more efficiently (faster) than command-and-control methods.

⁵ Ibid.

⁶ General Accounting Office [a]. *Toxic Substances: EPA Needs More Reliable Source Reduction Data and Progress Measures*, (Chapter Report, 09/23/94, GAO/RCED-94-93).

⁷ EPA (1996).

⁸ Ibid.

Companies that reported using or releasing one or more of the 17 target chemicals were encouraged by EPA to join the 33/50 Program. EPA solicited potential participants by extending invitations to three specific groups of firms, as seen in Table 2-3. The first group was invited in February 1991. This group represented the "Top 600" emitters of 33/50 Program chemicals. These firms were characterized by larger operations and accounted for more than 75 percent of the total 1988 releases and transfers of the 17 target chemicals. More than 60 percent of the "Top 600" companies chose to participate. The second group received invitations to participate in July 1991. This group represented the 5,000 remaining companies that emitted 33/50 chemicals in 1988 (all firms not on the "Top 600" list). The final group was invited to join in July 1992. This group was comprised of 2,500 firms that did not report 33/50 chemical releases in 1988, but did so in subsequent years. The second and third groups were characterized primarily by smaller operations and were less responsive to EPA's solicitation for Program enrollment; about 13 percent of these companies participated.

Table 2-3: Characteristics of Invited and Actual 33/50 Program Participants^{9,10}

Group	Firms	Number of Invitations	Invitation Date	Participation Rate
1st invited group	"Top 600" firms	600	February 1991	60%
2nd invited group	TRI reporting firms not on "Top 600" List	5,000	July 1991	15%
3rd invited group	Firms with no 33/50 chemical releases in 1988 but emitted some in later years	2,500	July 1992	12%
<i>Actual 33/50 Participants</i>	<i>Firms that emitted 63% of all 33/50 chemical releases in 1988</i>	8,100	-	16% 1,300 firms

The Program targeted parent companies, rather than individual facilities. By receiving pledges from the parent company, EPA sought participation from every facility within the company. Of the 8,000 companies contacted, 1,300 parent companies pledged participation. Releases and transfers reported by these companies represented 63 percent of all 1988 releases and transfers of 33/50 Program chemicals and 15 percent of all TRI emissions.¹¹ Participants pledged to voluntarily reduce 385 million pounds of pollution.

The Program was designed to recognize a company's participation when it submitted to EPA in writing its intention to participate and pledged a corporate-wide numerical reduction

⁹ Ibid.

¹⁰ Arora, S. and Cason, T. "Why Do Firms Overcomply with Environmental Regulations? Understanding Participation in EPA's 33/50 Program," *Discussion Paper 95-38*, Washington DC: Resources for the Future (1995).

¹¹ Ibid.

commitment for any of the 17 target chemicals through 1995.¹² There were no requirements on the reduction commitments and companies obligated themselves to whatever reductions were appropriate for their firm. Some companies focused their goals on all 33/50 chemicals, while others focused on a specific few, while still others promised to reduce all TRI releases, extending beyond the Program's 17 chemical emphasis.

Participants in the 33/50 Program received support from EPA in several forms. EPA organized regional pollution prevention workshops and conferences. The conferences brought together representatives from industry, government, academia, and public interest groups. They sought to foster an exchange of information on the varying perspectives of pollution prevention. The conferences also promoted collaborative action and partnerships among the conference participants. Further, they showcased companies that were successful at achieving pollution reductions and publicized them in EPA's media relations, documents, and newsletters.

Other support came in the form of technical assistance to 33/50 Program participants. Information was disseminated on emerging pollution prevention technologies for TRI chemicals. In addition, the Agency provided industry-specific guidance, reference manuals, bibliographic reports, and videos covering topics from generic pollution prevention to detailed instructions on setting up waste reduction programs for specific industries, processes, or materials. Finally, the Program also referred companies to training courses offered by states and private sources.

The 33/50 Program continued to accept new companies throughout its tenure, although efforts to actively solicit participation ended in 1994. While the Program's national goals were targeted for achievement by the end of 1995, companies have been encouraged to continue their reductions.

Summary of Program Effectiveness

TRI data have a two-year lag on public release, that is, chemical release data for 1995 are not available until 1997. The lag is due in part to a delay in both company reporting and EPA's compilation of aggregate industry releases. As such, the effectiveness of the 33/50 Program through 1995 cannot be determined until the second half of 1997. For now, the Program can be evaluated through 1994.

The 33/50 Program can be divided into two evaluation areas: fulfillment of the Program's goals (see Table 2-2) and agreement with the goals of the Pollution Prevention Act (PPA).¹³ Both areas are evaluated below.

EPA reports that all three of the 33/50 Program's goals have been fulfilled. The Program's interim goal of a 33 percent reduction in the 17 target chemicals was achieved one year

¹² EPA did not deny participation to any individual facility that wanted to participate, regardless of whether the parent company pledged its participation. This was criticized later by INFORM and GAO because the parent company received credit for participation even if only one of its facilities participated. Also, companies were recognized as Program participants regardless of whether a numerical reduction goal was specified.

¹³ Besides these two areas, EPA also evaluates emission projections through 1995. Our analysis omits company reduction projections due to the speculative nature of the estimations.

ahead of schedule and exceeded by over 100 million pounds, as seen in Table 2-4.¹⁴ The Program's ultimate goal of a 50 percent reduction in target chemicals was also achieved a year early. Altogether, the releases and transfers of 33/50 Program chemicals were reduced by 51 percent (757 million pounds) between 1988 and 1994. These reductions represent nearly twice the 385 million pounds initially pledged by participating companies.¹⁵

Table 2-4: EPA's Evaluation of the 33/50 Program's Goals¹⁶

Goal Name	Operationalized Goal	Outcome
• Interim reduction goal	• Reduce 17 TRI pollutants by 33 percent (491 million pounds) by 1992.	• Achieved in 1991, one year ahead of the 1992 target date • 590 million pound reduction • 40% reduction of Program chemicals
• Ultimate reduction goal	• Reduce 17 TRI pollutants by 50 percent (744 million pounds) by 1995.	• Achieved in 1994, one year ahead of the 1995 target date • 757 million pound reduction • 51% reduction of Program Chemicals • Reductions represent twice the amount pledged by participating firms
• General goal	• Show that voluntary pollution reduction programs work more efficiently (faster) than command-and-control methods.	• 33/50 firms reduced their chemicals at faster rates than non-participating firms • 33/50 chemical reductions were at faster rates than other TRI chemical reductions

EPA reports that the 757 million pound reduction is the minimum amount that Program participants attempted. About one-third of participating parent companies made pledges that extended beyond the Program's scope. For example, some Program participants pledged to continue their reductions after 1995. Other participants claimed a reduction for chemicals beyond the 17 target chemicals. Several multinational corporations, which were not targeted by EPA as potential participants, also pledged their reductions. Others went beyond targeting end-of-pipe releases or transfers by attempting to reduce their actual use of toxic chemicals.¹⁷

While the 33/50 Program was initiated in 1991, EPA uses 1988 as the baseline year to evaluate the Program's goals. TRI reporting facilities, however, began reducing their emissions of 33/50 chemicals prior to the Program's start; about 83 percent of all facilities began reducing 33/50 chemicals emissions between 1988 and 1991.¹⁸ For this reason, the General Accounting Office (GAO) has criticized EPA for using the 1988 baseline when analyzing the Program's

¹⁴ EPA (1996).

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Companies that focused on chemical reduction did not stipulate the impact such pollution prevention initiatives had on environmental releases of 33/50 Program chemicals.

¹⁸ Citizen Fund. *Pollution Prevention or Public Relations?* Washington, DC: May 1994.

effect.^{19,20} GAO argues that only reductions between 1991 and 1994 should be considered when evaluating the Program's progress.

As seen in Table 2-5, the Program's results change substantially when evaluating its first two goals subsequent to 1991. Between 1991 and 1994, 33/50 chemicals have fallen by 204 million tons, representing a 27 percent decrease in target chemicals, as compared to the 51 percent reduction using the 1988 baseline.

Table 2-5: Comparison of Baseline Years and Participant Reductions to Program's Reduction Goals

Goal Name	Reduction Goals and Year	Total Reductions 1988 to 1994	Total Reductions 1991 to 1994
• Interim reduction goal	1992: 33%	40%	12% ²¹
• Ultimate reduction goal	1995: 50%	51%	27%

EPA calculates the 33/50 chemical reductions by aggregating all firm reductions. The Agency does not distinguish between reductions that were made by Program participants and non-participants. Thus, reductions that were made by non-participants count towards the Program's goals. GAO estimates that 38 percent of targeted reductions are attributable non-participating companies.²²

EPA responded to GAO's criticisms by seeking an independent research firm to determine the Program's value. INFORM, a nonprofit environmental research organization, was selected to do the analysis. INFORM's analysis controlled for emissions reductions attributable to non-participating companies.²³ Its findings confirmed GAO's concerns about the Program's weak evaluation measures. INFORM showed that 31 percent of the participants had already initiated reduction activities prior to the announcement of the 33/50 Program.^{24,25}

EPA's evaluation of the third goal (the Program's general goal) attempts to separate the contributions participants and non-participants to better capture the Program's affect. The third goal was to demonstrate that voluntary pollution reduction programs work more efficiently (faster) than command-and-control methods. EPA shows that between 1991 and 1994, Program participants reduced their releases and transfers of target chemicals by 49 percent, whereas, non-

¹⁹ GAO[a].

²⁰ General Accounting Office [b]. *Toxic Substances: Status of EPA's Efforts to Reduce Toxic Releases*, (Chapter Report, 09/22/94, GAO/RCED-94-207).

²¹ Reductions between 1991 and 1992.

²² This estimate is 16 percent higher than EPA's approximation. EPA has recognized that a considerable portion of the reductions reported by the Program were achieved by firms not formally participating in the Program, but the Agency believes the Program's presence influenced some of these firms to reduce toxic releases.

²³ INFORM (1995).

²⁴ Ibid.

²⁵ EPA (1996) acknowledges that some of the Program's reductions did result from non-participants. The Agency estimates that about 26 percent of the reductions (196 million pounds) between 1988 and 1991 and 30 percent (82 million pounds) between 1991 and 1994 can be attributed to non-participating firms.

participating companies reduced their emissions of 33/50 chemicals by 30 percent, as seen in Table 2-6.²⁶ Thus there is a 19 percent reduction difference that may be due to the Program's affect. The reduction difference is also seen when comparing 33/50 chemical releases and transfers to other TRI chemical emissions. Between 1991 and 1994, 33/50 chemical releases and transfers fell by 42 percent as compared to all other TRI chemical releases which have fallen by 22 percent. Thus Program participants achieved greater reduction quantities in less time than did non-participants.

Table 2-6: EPA's Comparison of 33/50 Program Participants to Non-Participants and 33/50 Chemicals to Other TRI Chemicals²⁷

Issue	Years	33/50 Program Participants	Non-participants
• Releases and transfers of Program chemicals	1991 to 1994	-49%	-30%
• Percent of total 33/50 chemical reduction	1991 to 1994	70% of total	30% of total

Issue	Years	33/50 Program Chemicals	Other TRI Chemicals
• Releases and transfers of Program chemicals for treatment and disposal	1988 to 1991 1991 to 1994	-16% -42%	-20% -22%
• 33/50 chemicals in production-related waste	1991 to 1994	- 1%	9%

The PPA focuses on reducing waste at its source, thereby preventing pollution rather than controlling or treating it. When EPA launched the 33/50 Program it emphasized reducing toxic chemicals through source reduction. The extent to which the 33/50 Program has fulfilled the PPA's goals is the second area to evaluate the 33/50 Program's success. The best indicator for a firm's source reduction activity is its variation in production-related waste. A company's production-related waste is determined by aggregating all its recycled, reused, combusted, treated, and released emissions both on- and off-site. It includes all waste management practices other than pollution prevention. When production-related waste falls, source reduction is likely to increase. The 33/50 Program did not require participating firms to reduce their chemical emissions through source reduction. This may be one reason for the marginal changes in production-related waste. Between 1991 and 1994, participating firms have reduced their production-related waste by 1 percent, as seen above in Table 2-6. Non-participating firms, however, have *increased* their production-related waste by 9 percent. So, while source reduction activity is low for 33/50 firms, it still outpaces the activity by non-participants.

²⁶ EPA (1996).

²⁷ Ibid.

Citizen Fund, GAO, and INFORM have all criticized EPA for not following the PPA's emphasis on source reduction.²⁸ All three organizations argue that the Program's emphasis on source reduction should have been an integral part of its goals and a requisite for participation. Because source reduction was not required, it was not the preferred waste management method. Most companies relied primarily on end-of-pipe treatment technologies or on-site recycling and energy recovery, rather than source reduction, to reduce their releases and transfers of the 17 Program chemicals.²⁹

The 33/50 Program's 5-year existence is too short to draw any causal relationships between the Program and emissions changes; only associations can be shown. As such, the reader should regard the results presented above with caution; they are only trends.

Relevance for Industry Incentives

EPA designed the 33/50 Program so that companies would participate for a variety of reasons. The Agency hoped that firms would participate to take advantage of the early emissions reduction provisions in the CAAA. EPA also believed that companies would view participation as an opportunity to gain public recognition for their commitment to pollution management. Finally, the Program was designed to give participants great flexibility in reducing emissions and required few prerequisites to join the Program, thereby minimizing the administrative burden and allowing firms to decide their most cost-effective method of pollution control.

The incentive to participate in order to qualify for credit under the early emissions reduction provision of the CAAA has not been significant, as participation in the Early Reductions Program is limited. In 1994, EPA had only 40 active applications from facilities and had approved 12 for the 6-year extension. The low applicant response may be due to several reasons. First, it is not certain whether 33/50 participating companies knew of the early reduction incentives when they pledged their participation to EPA. The small number of active applications may reflect a limited number of companies having knowledge of its existence rather than lack of interest. A second, reason for the low applicant response may be due the program's extensive qualification requirements.³⁰ To qualify, facilities must establish base-year emission levels and demonstrate a 90 to 95 percent reduction from those levels. The compilation of base-year data is a difficult process, requiring a significant investment of time and personnel. Consequently, some facilities withdrew their applications to participate in the program once they realized the amount of resources needed to fulfill the program's requirements.³¹

Large firms were more likely to participate in the 33/50 Program. About 60 percent of all participating firms were characterized as being large companies with high quantities of both 33/50 and total TRI chemical emissions. These companies were more likely to have the resources available to invest in pollution reduction activities. Many of these companies began their reduction activities immediately after the announcement of the 1988 TRI data and for the two years prior to the initiation of 33/50. By participating in the 33/50 Program, these companies

²⁸ Citizen Fund (1994), GAO [a][b](1994), and INFORM (1995).

²⁹ INFORM (1996).

³⁰ GAO[b] (1994).

³¹ Ibid.

were able to capitalize on the reductions that they had already made, showcase their concern for the environment, and receive publicity through EPA and their own marketing strategies. For firms that were concerned about their environmental image after TRI data were first made public, the 33/50 Program may have been a vehicle to show their support for corporate environmental management.

Finally, program participant's pollution management focused mainly on emissions control and recycling techniques rather than source reduction. As noted earlier, EPA did not require source reduction activities as a requisite for participation. Yet even without the explicit emphasis on source reduction, firms participating in the 33/50 Program had a greater incentive to reduce waste at the source. While production-related waste has increased, it has been at a smaller rate than waste production for non-participating firms. The Program gave flexibility to its participants and encouraged innovative approaches to pollution control rather than requiring prescriptive standards for waste treatment and disposal. Thus companies could determine their most cost-effective means to reduce emissions which often includes reducing waste at the source. Also, the Program offered industry-specific technical assistance and information on emerging pollution prevention technologies, thereby increasing the likelihood of source reduction.

Arora and Cason (1995) researched the statistical probability of a firm participating during the first two years of the Program.³² Their analyses show that firms characterized by high customer interfacing were 20 percent more likely to participate in the 33/50 Program, as seen in Table 2-7. The authors speculate that one reason for the increased firm participation is due to a greater proximity to the final customer. EPA marketed the Program as a means for firms to gain public recognition for their responsible environmental management. Those firms whose operations were closer to their final customer were more likely to be able to capitalize on the increased public recognition and participate in the Program.

Table 2-7: Characteristics of Firms Likely to Participate in the 33/50 Program³³

Firm Description	Increased Probability of Participation
High customer interfacing	20 percent
High R&D intensity	12 percent
Large number of employees	44 percent
High non-33/50 chemical releases	99 percent
High 33/50 chemical releases	22 percent

Arora and Cason also show that firms with larger investments in research and development (R&D) were more likely to participate in the Program. The authors argue that this was because firms engaged in substantial R&D had the capability to devote resources towards

³² Arora, S. and Cason, T. "Why Do Firms Overcomply with Environmental Regulations? Understanding Participation in EPA's 33/50 Program," *Discussion Paper 95-38*, Washington DC: Resources for the Future (1995).

³³ Ibid.

pollution management. R&D increased the likelihood of participation by 44 percent. In addition, the results also show that larger firms had an increased the likelihood for Program participation. This relationship is partially verified by EPA's report of a 60 percent participation rate from larger firms at the Program's close.³⁴ The authors speculate that larger firms have greater access to resources that could be dedicated towards pollution reduction and Thus they are more likely to participate. Finally, a firm's quantity of chemical emissions, both 33/50 and non-33/50 showed a significant relationship with its likelihood for Program participation even after firm size was controlled. Thus firms with higher chemical releases were more likely to participate in the 33/50 Program.

In closing, while the 33/50 Program appears to have met its goals other factors besides participant reductions have contributed to its success. Reductions made by non-participating firms and reductions made prior to the Program's start have diluted the Program's effect. When controlling for these variables, though, the Program may have resulted in an additional 19 percent reduction in 33/50 chemicals.³⁵ The Program's flexibility, technical assistance, and publicity may have encouraged these enhanced reductions, although the data that to support the assertion are limited. What is known about firm participation is that larger firms with greater chemical releases were more likely to participate. Also, firms with larger investments in R&D and greater customer interfacing had a greater probability of participating in the Program.

³⁴ EPA also reports projections through 1996 which are omitted due to the speculative nature of the estimations; Environmental Protection Agency. *EPA's 33/50 Program Sixth Progress Update, Continuing Progress Toward Ultimate Reduction Goal*, Office of Pollution Prevention and Toxics (9/95 EPA 745-K-95-001).

³⁵ EPA shows that between 1991 and 1994, Program participants reduced their releases and transfers of target chemicals by 49 percent, whereas, non-participating companies reduced their emissions of 33/50 chemicals by 30 percent, as seen in Table 2-6. Thus there is a 19 percent reduction difference that may be due to the Program's affect.

5. OSHA's VOLUNTARY PROTECTION PROGRAMS

Introduction

The Occupational Safety and Health Administration's (OSHA) Voluntary Protection Programs (VPP), adopted on July 2, 1982, are voluntary, cooperative agreements among labor, management, and the federal government. The VPP's purpose is to recognize and promote excellence in employer-provided occupational safety and health management. The primary goal of participation in OSHA's VPP is reduced workplace injuries and illnesses. Other intended benefits of the program include employer financial savings, improved employee morale, enhanced ties with the regulator and employees, and increased production, presumably the fruit of improved employee morale and fewer lost employee workdays.

There are three VPP programs: Star, Merit, and Demonstration. The Star program is the most demanding program of the three. OSHA's Star program requirements are based on the most comprehensive safety and health programs used by American industry. The program aims to recognize leaders in injury and illness prevention programs who have been successful in reducing workplace hazards and to encourage others to such success. In order to be eligible for the program, a general industry applicant (non-construction applicant) must have an average of both lost workday injury case (LWDI)¹ rates and injury/illness incident (II)² rates for the most recent three year period at or below the most recent specific industry average published by the Bureau of Labor Statistics (BLS). Requirements for an application from a firm in the construction business are slightly different. The LWDI rates and II rates must be at or below the national average for that type of construction. Star participants are expected to demonstrate continuous improvements in LWDI rates and II rates during their triennial evaluations.

A site's³ safety and health program must satisfactorily address the following areas in order to qualify for the Star program: management commitment and planning, hazard assessment, hazard construction and control, safety and health training, employee participation, and safety and health program evaluation. By addressing these areas, employers have the opportunity to go beyond standards set by OSHA to provide the best possible safety and health protection at a site. Employers who are approved for VPP participation are removed from routine inspection lists. This frees OSHA's inspection resources for visits to establishments that are less likely to meet the requirements of the OSHA standards. If problems do arise, OSHA and VPP participants address them cooperatively. VPP does not diminish in any way employer/employee rights or responsibilities under the Occupational Safety and Health Act of 1970.

The Merit program is aimed at employers in any industry who do not yet meet qualifications for the Star program but who wish to work toward Star program participation. An applicant will be admitted to the Merit program if OSHA determines it has demonstrated the commitment and potential to achieve Star status. The Merit program is open to sites with injury

¹ Lost workday injury/illness (LWDI) rate refers to the number of lost workdays through occupational injury or illness per 100 employees.

² Injury/illness incident (II) rate refers to the number of occupational injuries/illnesses per 100 employees.

³ A site may be defined as the geographical location of a facility or set of facilities. A facility may be defined as one or more buildings at a site associated with the same activity or function.

rates worse than the industry's national average. The Merit program is used to set goals, that when achieved, will qualify the site for Star participation. A site will be approved for Merit status if it is expected to reach Star status.

The Demonstration program provides the opportunity for companies to demonstrate the effectiveness of alternative methods which, if proven successful, could be substituted as alternative qualifications for the Star program in certain situations. It is also an opportunity to experiment with safety and health programs in industries, such as maritime and agriculture, not traditionally associated with such programs. It also provides a vehicle to test ways to overcome problems that may have discouraged small businesses from participating in the VPP.

As of May 1, 1996, there were 231 participating worksites in the VPP -- 191 in Star, 37 in Merit, and 2 in Demonstration.⁴ 98 different companies are enrolled in VPP.⁵ There are more worksites than companies participating in the VPP because many companies are represented by more than one worksite. International Paper has the highest number of participating sites, 17.⁶ Occidental Chemical and Mobil Chemical are second and third with 12 and 10 participating sites respectively.

Participating worksites involve more than 203,850 workers. This is less than one-half of 1% of the workers in the mining, construction, manufacturing, transportation and utilities, wholesale trade, and hospital industries.⁷ This is approximately 1% of the workers in just the manufacturing industry. 207 of the 231 (87%) participating worksites are from manufacturing.⁸ 73 (32%) of the participating worksites are from the chemical manufacturing industry.⁹ Only 3 of the 98 participating companies fit the traditional definition of a small business -- no more than 500 employees in a company. The primary reason for lack of small business representation is that most small businesses simply do not have the resources necessary for participation.

The Occupational Health and Safety Act of 1970 (29 USC 651) provides the statutory framework for OSHA's VPP. It was enacted "to ensure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources." Section 2(b) of this act specifies the means Congress intended OSHA to use to implement these goals:

(1) by encouraging employers and employees in their efforts to reduce the number of occupational and safety health hazards at their places of employment, and to stimulate employers and employees to institute new and to perfect existing programs for providing safer and healthful working conditions."

(4) "by building upon advances already made through employer and employee initiatives for providing safe and healthful working conditions."

(5) "by developing innovative methods, techniques, and approaches for dealing with occupational and safety health problems."

⁴ Occupational Health and Safety Administration. *Voluntary Protection Program Facts*, May 1, 1996, p.1.

⁵ Ibid.

⁶ However, this is just over 4% of the 400 or so Weyerhaeuser sites eligible for entry into the VPP program.

⁷ This figure is based on 1994 employment data, provided by the *1995 Statistical Abstract of the United States* published by the US Department of Commerce, for the aforementioned industries, the types of industries participating in OSHA's VPP.

⁸ These figures are calculated from OSHA's 1995 VPP data base.

⁹ Ibid.

(13) "by encouraging joint labor-management efforts to reduce efforts to reduce injuries and disease arising from employment."

A commonly asked question about VPP is: aren't OSHA's standards sufficient to accomplishing all the goals established by the act? OSHA believes compliance with its standards alone is not sufficient to accomplish the goals established by the act. Standards, no matter how carefully conceived and properly developed, will never cover all unsafe activities and conditions. In addition, limited resources will never permit regular or exhaustive inspections of all the nation's workplaces. It is employers and employees with their daily experience in the workplace that have an intimate knowledge of all the processes, materials, and hazards associated with a particular industry. This knowledge, combined with the ability to evaluate unique hazards quickly, allows employers and employees to improve workplace safety in ways simply not available to OSHA.

How effective has the VPP been?

Evaluating the effectiveness of OSHA's VPP programs is difficult. OSHA states that the purpose of the VPP is to emphasize the importance of, encourage the improvement of, and recognize excellence in employer-provided site-specific occupational safety and health programs. OSHA's VPP certainly does these things. However, the ultimate question of whether OSHA's VPP brings about significant improvements in the safety and health records of our nation's worksites is more difficult to determine.

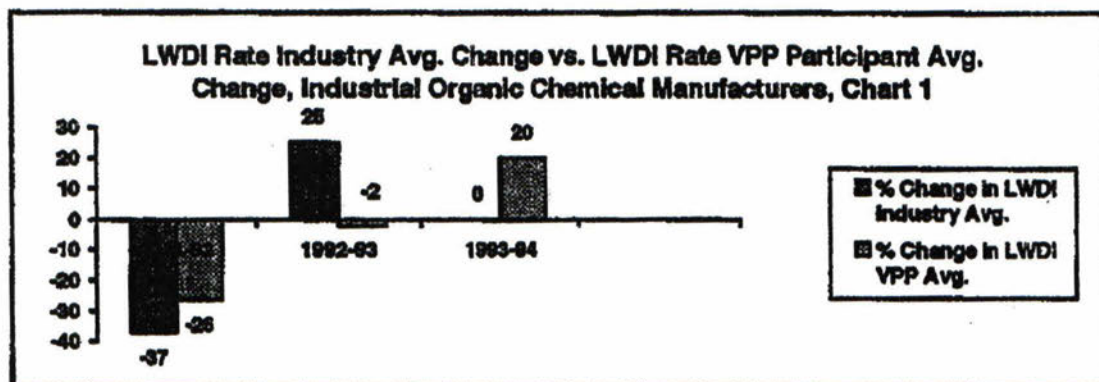
One reason for the difficulty in assessing the effectiveness of OSHA's VPP is the paucity of data on the safety performance of companies before and after they entered the VPP. Both OSHA and the Voluntary Protection Programs Participants' Association (VPPPA), a private non-profit group of VPP members that helps OSHA publicize and support voluntary protection, have some data on the performance of companies after they entered VPP, but they possess very little data about a company's performance before entering the program. As a result, it is almost impossible to ascertain whether the significant improvements in LWDI rates and II rates that OSHA and VPPPA present were actually due to participation in the program, were simply the continuation of a trend, or were greater when a participating company was outside the program.

For instance, the Thrall Car Manufacturing Company in Winder, Georgia decreased its LWDI rate from 17.9 in 1989 when the facility began implementing a VPP quality safety and health program to 4.6 in 1992 when the plant was ready to qualify for the Star program.¹⁰ No data is given to indicate what the LWDI rates were before Thrall's entry into the VPP in 1989. The decreases occurring from 1989-1993 may very well have been the continuation of a trend.

A second consideration is that two of the criteria for acceptance into the Star program are decreases in II rates and LWDI rates over the preceding three years. If a company is achieving reductions in these safety and health indicators even before official entry into the program, then it is difficult to determine whether VPP pushed a particular company to improve their safety and health programs or whether this was occurring anyway and the company simply wanted recognition for it.

¹⁰ Voluntary Protection Program Participants Association (VPPPA), "Benefits of VPP Participation: Data from VPP Sites", June 1996.

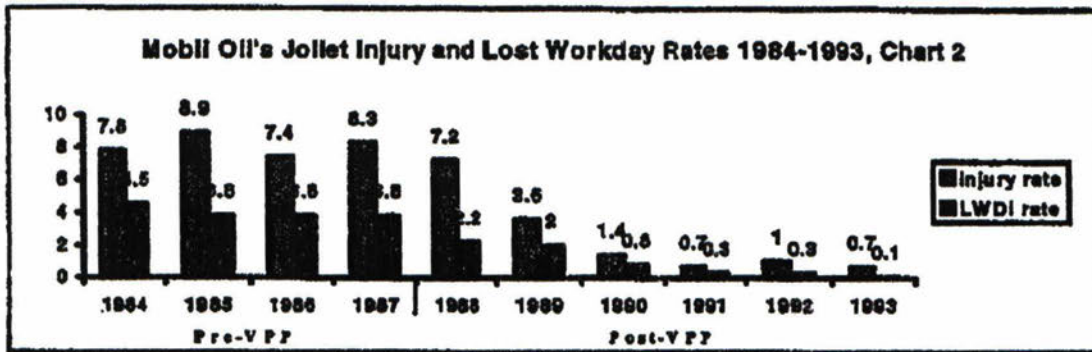
Even a comparison of the percent change in LWDI rates and II rates of companies participating in the VPP with their industry average doesn't reveal much about VPP's impact. The most represented industry in the VPP, manufacturers of industrial organic chemicals, saw average industry II and LWDI rates change more favorably than the average II and LWDI rates of VPP participants for 2 of the 3 years for which data was available (See Chart 1). It is likely that, with the improvement occurring in safety and health performance throughout industry, the industry II and LWDI average are likely to be improving more rapidly than the average of VPP participants in many industries, not just in the industrial chemical manufacturing industry. This reality makes assessing OSHA's VPP quite difficult.



Source: Calculated from OSHA's 1995 VPP Data

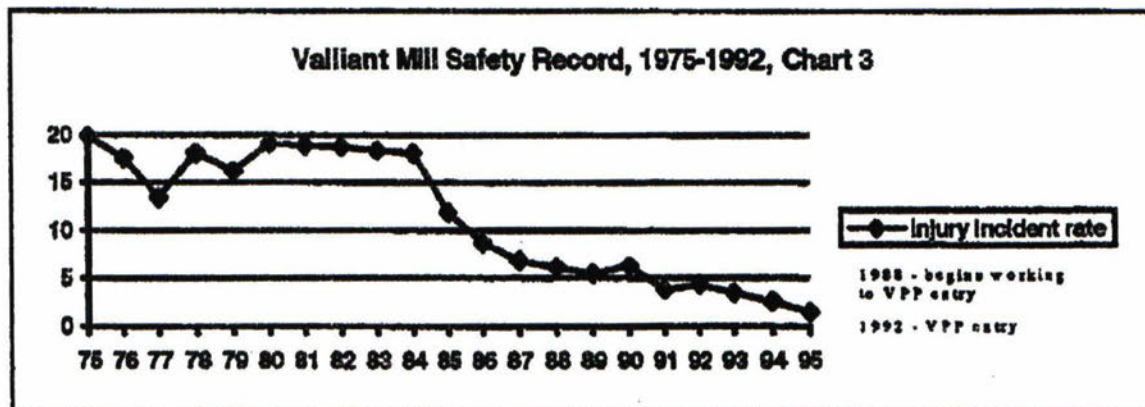
Note: Positive numbers indicate a worsening safety performance. Negative numbers indicate an improving safety performance.

With all this in mind, OSHA and VPPPA do provide some data which indicates that the VPP does improve a site's safety and health performance. Mobil Oil's Joliet, Illinois refinery's LWDI rates from 1983-1987 were 4.5, 3.8, 3.8, and 3.8 respectively. Mobil believed its safety program had "plateaued". It was dissatisfied with this performance and wanted to see improvement. In 1988, the Joliet refinery began implementing VPP safety and health programs. Following OSHA's VPP framework, Joliet increased employee involvement and top management participation and improved documentation which allowed Joliet to refine its safety and health program. By 1993, two years after its approval to the Star program, its LWDI rate was 0.1 (See Chart 2).



Source: Voluntary Protection Program Participant's Association. "Benefits of VPP Participation: Data from VPP Sites," 1994.

The Weyerhaeuser Paper Company provides another good example of how the VPP improves a site's safety and health performance. Valliant Mill, producers of pulp and paper container board in Oklahoma, like Joliet, believed its safety and health performance had "plateaued" in 1988. As a result, Valliant began using OSHA's expertise in an attempt to qualify for the VPP and to further improve its safety and health performance. In 1992, OSHA approved Valliant for the Merit program. 1994 witnessed Valliant's entry into the Star program. Even though Chart 3 seems to indicate improvements were already occurring before Valliant's VPP association, Roger Strain, Valliant's safety and health manager, maintains further improvement probably would not have occurred without OSHA's expertise.



Source: Voluntary Protection Program Participant's Association. "Benefits of VPP Participation: Data from VPP Sites," 1994. Roger Strain, Safety and Health Manager of Valliant provided data from 1993 to 1995.

Why do some sites participate and not others? Companies generally leave site participation to the discretion of local site managers. Sites that do not participate generally believe that VPP uses too much time and too many resources to be worthwhile. However, the sites that do participate believe the benefits outweigh the costs. The benefits of participation will be discussed in the following section.

What are industry's incentives for participating in VPP?

There are a number of reasons for the participation of companies in OSHA's VPP. One reason for VPP participation is the recognition it brings to companies. Companies are always looking for a competitive edge. Some companies believe VPP participation enhances their image in the eyes of their customers. For instance, many of the customers of Fisher Controls, manufacturers of rotary and ball control valves, are companies that also participate in the VPP. Fisher believes its participation in the program increases its attractiveness to potential buyers of its products.

A second reason for VPP participation is that OSHA provides a set of fresh, independent eyes to inspect a site's safety and health program and to evaluate its quality. OSHA provides external-validation that a company's safety and health program is operating effectively. OSHA inspects Star participants once every three years. If a participating Star site has been inspected once and is in good standing, OSHA performs subsequent inspections as infrequently as once every five years. OSHA's VPP onsite inspections are more frequent and more thorough than OSHA's programmed compliance inspections, which occur as infrequently as once every 20 to 30 years. OSHA's VPP onsite inspections require safety specialists and industrial hygienists to spend up to two days to exhaustively examine the worksite to identify the types of hazardous conditions that might exist. Some companies insist that one motivation for entering the program is subjecting the site to OSHA's expert evaluations. The evaluations usually result in recommendations that lead to refinement of a company's safety and health program.

The fact that more time and resources seem to be spent scrutinizing Star program participants, the best examples of excellence in safety and health performance in industry, than other companies seems to indicate that OSHA's priorities may be misplaced. However, it is important to realize that OSHA's average programmed inspection time period of 20 to 30 years per company is misleading. OSHA inspects the most hazardous companies, which it determines based on injury and illness rates, far more frequently, as often as every couple of years. In addition, no companies are exempt from OSHA's investigation of employee complaints. One aspect of the Star program which is appealing to Star participants is the fact that any situation that involved employee endangerment would be resolved cooperatively with OSHA. OSHA's inspectors would not storm a company's property or take any enforcement action unless cooperation did not resolve the problem.

OSHA justifies their use of resources in this way by pointing out that the direct impact of VPP evaluations is greater than OSHA compliance inspections. What is the evidence for this? OSHA data show that an average of 91 employees are covered by each OSHA compliance inspection; an average of 756 employees are covered by each VPP onsite evaluation. Every hour of OSHA compliance activity covers 3.0 employees; every hour of VPP activity covers 8.3 employees.¹¹ However, one could argue that the impact of OSHA compliance inspections, even if they target fewer employees per inspection, might very well be more important because a typical OSHA site has much greater room for improvement than a Star site which by definition is supposed to be among the best in its industry.

¹¹ Catanzaro, Gerry. "Answers to Some Frequently Asked Questions on VPP", *Job Safety and Health Quarterly*, Summer 1994, p. 22.

A third reason for VPP participation is that it allows companies to have a good relationship with the regulator. Working cooperatively with the regulator means a company's views and concerns are more likely to be incorporated during formulation of regulations and enforcement guidelines. Companies have gradually come to realize that OSHA's commitment to cooperation is genuine. This in part accounts for the increase in company VPP participation from 51 in 1995 to 98 in 1996. Cooperation is a contrast to the adversarial relationship that often typifies OSHA/industry relations.

The VPPPA cites employee benefits as another incentive for participation in the VPP. VPP participants report higher morale among employees, increased productivity, decreased absenteeism, and an increase in the quality of production. Unfortunately, VPPPA provides little data to substantiate these claims. For example, VPPPA points out that the Ford New Holland Plant in Grand Island, Nebraska experienced a 13% increase in productivity and a 16% decrease in scrapped product that needed to be reworked during its first three years in the VPP.¹² Nothing is mentioned about what levels of productivity increases and scrapped product decreases were before entry into VPP. They may very well have been greater. Also, it is possible that the productivity increases were due to other factors such as improved technologies or management strategies.

A final and perhaps most important reason for VPP participation is its impact on a company's bottom line -- its profits. OSHA's inspections, program requirements, and evaluations of VPP participants, though only partially responsible, are almost certainly due some credit for reducing II and LWDI rates. The decline in II and LWDI rates enable these sites to have lower worker compensation premiums and insurance rates. So not only is the workforce benefited with safer working conditions, but a company's competitiveness is enhanced.

For instance, the Monsanto Chemical Group in Pensacola, Florida reported workers' compensation costs of \$168,000 in 1989, the year of its VPP approval. Four years later, the facility experienced workers' compensation costs of \$87,000.¹³ Mobil Oil Corporation's Paulboro, New Jersey Refinery experienced even more dramatic savings. Mobil Oil Paulboro reported worker's compensation costs of \$200,000 in 1991, and costs of \$22,000 in 1994, the year the facility was approved into the VPP.¹⁴ Again it is important not to interpret this data out of context. Certainly, companies don't need OSHA's VPP to look out for their profit margin. They probably would have achieved most if not all these reductions on their own without VPP. However, OSHA's VPP does provide an extra set of eyes, a forum for recognition of safety and health excellence, and an opportunity to develop a cooperative relationship with the regulator.

Policy Implications/Lessons for Future Initiatives

What is to be learned from this look at OSHA's VPP? One lesson is that even a program that's almost 14 years old and that seems to save companies money and provide other benefits, still has a very low participation rate. One reason for this is that many companies believe they

¹² VPPPA.

¹³ Ibid.

¹⁴ Ibid.

have excellent safety and health programs already, so the cost in time and resources of participating in OSHA's VPP does not justify the marginal benefits.

A second lesson from the program is that it is difficult to get small companies to participate in the program primarily because they lack the resources of the larger companies. Yet it is the smaller companies, because of their lack of resources to develop extensive safety and health programs, that most often need the expertise that the VPP is able to provide.

A third lesson is that there is no perceived need on the part of OSHA to provide convincing evidence that the program is working; self-evaluation is not a part of its culture. OSHA does provide some data which it believes validates the program to some extent. However, the data OSHA presents, as discussed earlier in this paper, is not convincing. OSHA presents little data on the performance of companies before they entered the VPP, so the impact of the VPP on these company's LWDI and II rates is unclear.

7. GENERAL CONCLUSIONS

Program Evaluation

The most important conclusion about the federal programs examined is that four of the five programs (SO₂ emissions trading is different in almost every way from the other four programs) are peripheral, both to business and society. They do not address most of the important problems with the pollution control system nor do they contribute significantly to improving environmental quality.

OSHA Star and the programs related to it have succeeded in establishing a positive image, but it is very debatable whether the programs have made any major contribution to occupational safety and health. OSHA has no information to support such a contention. Of the few companies we talked to who had facilities participating in the OSHA program, some thought the Star program contributed to improved worker safety, others did not think so. From the perspective of OSHA, the programs allocate scarce resources to the facilities that least need it. From the perspective of participating companies, the programs improve the working relationship with OSHA, but most companies hardly ever see an OSHA inspector anyhow.

XL and CSI may be too new to evaluate with any certainty, but there is no indication that either program will make a major contribution to environmental improvement or to lowering the cost of the pollution control system. Both programs have contributed to improved communications among the interested parties, but the other side of this coin is the high transactions costs of participating in either program. As of this writing, it seems quite possible that the high transactions costs and low pay-offs will result in the demise of one or both programs.

33/50 is quite different from XL and CSI in that the transaction costs of participating were close to zero. The minimal threshold for participation and the looseness of the criteria for success make it difficult to know how much impact 33/50 had. It has met its goals, and the group hired to impartially evaluate the program believes that the existence of the program did contribute to the reduction in toxics that was achieved. A number of industry people believe that the program was instrumental in reducing toxics emissions. However, it is debatable whether a program like 33/50 could be successful today.

It is worth examining why the three EPA programs have not achieved more. We think there are three major reasons: 1) the lack of a statutory base; 2) EPA management; and 3) pervasive mistrust.

The pollution control system, to an even greater degree than most government programs, is driven by legislative mandates. What gets done, when it gets done, and how it gets done are all determined by the statutes and the litigation that follows the statutes. It is therefore very difficult to make any non-statutory program work. Decisions are difficult to reach, because in the absence of statutory authority consensus must be the mode of decision-making. Business participants steer the programs to peripheral matters because their general counsels caution them against taking any action that might result in litigation, and EPA cannot provide protection against third-party suits. EPA personnel give the non-statutory programs low priority because most of their effort is devoted to meeting requirements set by Congress and the courts.

We do not have enough information to pass judgment on EPA's management of the programs. However, there is good evidence that for all three programs the advanced planning in EPA was inadequate. This made less difference for 33/50 than for CSI and XL. For the latter two, the agency seemed uncertain about what it wanted to accomplish or how it planned to do it. Also, because the agency is organized and structured to implement statutes, the organization to implement the non-statutory programs is *ad hoc* and not well coordinated with the rest of the agency.

Pollution control efforts are generally characterized by mistrust and paranoia. Each of the major elements—business, enviros, EPA, the states, Congress—tends to think that the other elements are intent on undermining the public interest and that these other elements have a major advantage in whatever battles take place. In this climate, programs that depend for their success on cooperation, voluntariness, and trust do not fare well.

The SO₂ emissions trading program has been successful in lowering compliance costs, although it is difficult to separate the effect of the trading provisions from the effect of the other SO₂ provisions in the 1990 CAAA. At the least, it can be said that flexibility in meeting standards sharply lowers the cost of meeting the standards, and that trading can be an important component of flexibility. As with XL and CSI, SO₂ trading is a relatively new program, and a much more definitive evaluation will be possible in the future.

A final important note with regard to evaluation is the inadequacy of efforts by the responsible agency to evaluate the success or failure of the programs. 33/50 is an exception to this—in response to criticisms of the program by GAO and others, EPA did build in an ongoing evaluation of the program. But the other four programs lack such capability. If the agency, Congress, and the public are supposed to learn something from these programs then it is essential that the implementing agency provide a neutral ongoing evaluation. In the absence of such evaluation, judgments about the program will be based on politics and the skills of the spin doctors—not an effective basis for making public policy.

Business incentives

Just as it is difficult to find a regulation that fits all firms, it appears that there is no single incentive that appeals to all businesses. In fact, it is difficult to find a voluntary federal initiative that appeals to business at all. Four of the five initiatives we examine are largely voluntary programs. Some of the OSHA VPP is codified, but participation is not mandatory. The sulfur dioxide program, established under Title IV of the Clean Air Act Amendments, is an exception and thus participation rates cannot be used as a proxy to test whether the incentives under the program are attractive to business.

Our analysis of participation rates under the four voluntary federal programs studied show that the initiatives tend to attract very few businesses. Of the four initiatives, 33/50 has attracted the most participants, followed by OSHA Star. Of the 8,000 manufacturers invited by EPA to join 33/50, about 14 percent signed on. Similarly, there are about 98 companies with 231 work sites enrolled in OSHA's VPP program. Only ten facilities of extremely large U.S. market-leaders are implementing XL project plans. About 20 companies participate in CSI.

Table 7-1 shows that the different federal initiatives tend to feature different types of business incentives. Incentives depend in part on the goals of the program and types of firms that are targeted. For example, the goal of the emissions trading program is to lower the cost to firms of complying with sulfur dioxide reduction requirements of the Clean Air Act Amendments. To achieve this, the program targets a relatively narrow group of similar firms that emit large amounts of the substance, and are thus comprise a potential market of buyers and sellers of emissions.

As Table 7-1 illustrates, the SO₂ emissions trading program offers participants the most tangible economic benefits. Direct financial incentives under the program include both market emissions trading provisions, as well as greater flexibility in how firms may achieve reductions. In contrast to the sulfur dioxide program, 33/50 is designed to provide participants with greater public recognition. OSHA VPP is advanced as an excellent way to improve relationships with regulators. As originally conceived, CSI was designed to appeal to some firms that sought to improve relationships with suppliers and with other firms in a sector.

Table 7-1

Business Incentives Contained in Five Federal Initiatives						
	Direct financial	Indirect financial	Public recognition	Regulatory relations	Corporate customer relations	Public customer relations
33/50			X			X
OSHA Star				X	X	
SO ₂ Trading	X					
CSI		X			X	
Project XL		X				X

Because the goals and the incentives under the five initiatives vary, business participants offer different reasons for selecting particular programs. 33/50 and OSHA Star both appeal to companies because the initiatives tend to dovetail with internal company programs. Firms also are attracted to clear, demonstrable goals. 33/50's emission reduction goals that are gauged by the Toxics Release Inventory rate highest in this regard. Firms also are attracted to tangible rewards such as OSHA Star's decreased oversight and reporting provisions. Firms also prefer simple initiatives. 33/50 requires companies to do little more than sign a letter and a pledge to try to work toward program goals.

The experience with 33/50 demonstrates two important general themes. First is the importance of simplicity. When EPA tried to initiate a follow-up program but with additional checks and controls, potential industry participants balked at the controls and declined to participate. The program never got underway. The second theme gets to the reason for initiating such controls. Environmental groups had misgivings about 33/50 because of the lack of any controls, and some groups argued for third-party audits to check on the results achieved by facilities. The enforcement office in EPA similarly was uncomfortable with a program in which compliance could not be enforced through litigation. There is a fundamental conflict between the business community's desire for flexibility and simplicity and the environmental community's

desire for certainty and enforceability. Lack of trust underlies the environmentalist perspective and until some way can be found to increase mutual trust the fundamental conflict will remain.

CSI and Project XL are generally unappealing to most businesses because they require company employees to attend numerous meetings, draft lengthy plans and progress reports, and solicit public input. Also, because CSI and XL depart so significantly from the existing regulatory system, non-participants perceive the probability of success of these two initiatives as fairly low. Still, for a handful of business, CSI and XL's potential payoff are great enough to warrant the time and resource commitments. XL participants are attracted to the potential for innovative regulatory flexibility and the chance to solve problems creatively.

In summary, while the federal initiatives we examined may tell us whether the program provided appealing incentives for the targeted industry, they cannot tell us whether such incentives work for all businesses. For example, 33/50 targets large manufacturers that emit and transfer large amounts of toxic emissions. It is unclear whether such a system would appeal to small service industries whose emissions tend to fall below TRI reporting thresholds. Similarly, the direct financial incentives offered under the emissions trading program targets a fairly narrow group of firms that emit large amounts of sulfur dioxide. It may be more difficult to use emissions trading schemes in cases where one facility tends to account for most of the major releases of a certain type of pollutant, or where there are a large number of small sources.

Thus far, our discussion assumes that federal regulatory agencies have the ability to devise and implement programs that provide significant business incentives. Even if there were conclusive data to isolate what incentives among the federal initiatives works best, business would still have to agree that federal regulatory agencies are the best source of such incentives. While there is currently little agreement on what types of federal initiatives work best, there is even less agreement among business whether the federal government should administer such programs.

Many businesses want state agencies to have greater authority for crafting and administering initiatives. Some smaller businesses do not want initiatives, but simpler reforms, such as one-stop permitting schemes. In contrast, some large, multinational corporations seek incentives that help them to compete in a global economy.

The diversity of viewpoints is not merely a function of the diversity of business. Even business associations which share similar goals and company characteristics, such as GEMI, have difficulty agreeing on what types of incentives are most desirable.

While it is difficult to state with any certainty what types of business incentives are most desirable, the five initiatives do illustrate what *program* features business find most appealing. It appears that simplicity is the rule. Attractive programs and initiatives such as 33/50 and OSHA VPP tend to mirror ongoing EHS programs within firms. Business also prefers initiatives with clear goals and objectives. Initiatives that require significant employee time and other resource commitments are not as appealing as initiatives such as 33/50 which require little more than a corporate signature and good faith efforts to meet program goals.

For the handful of firms that want to commit company hours and budgets to intensive programs such as CSI and XL, regulators should give them the opportunity to do so. But in

doing so, regulators also must understand that unless such bold initiatives deliver demonstrable results, most businesses will prefer to invest their time and effort elsewhere.

Lessons for the Future

There is widespread discontent with the existing regulatory system. This can be determined by talking to almost any of the regulated or any of the regulators, and it is highlighted by the peculiar phenomenon of the EPA Administrator putting the highest priority on agency efforts to circumvent the basic statutory system that is supposed to govern the agency's actions.

There is not a consensus on how to change the existing system. Although there is agreement on some abstract principles, e.g. there should be more flexibility and greater efficiency, the agreement breaks down as soon as specific measures are proposed. Even among large corporations, there is disagreement over such basic questions as whether existing standards should be maintained and whether standard-setting should be decentralized to the states.

Given the lack of consensus, if the badly broken pollution control system is to be mended it will have to be done through some problem-solving negotiating mechanism. It so happens that the Founding Fathers in their great wisdom provided just such a mechanism in the form of the U.S. legislative system. A basic conclusion to be drawn from our look at the administrative attempts at reform is that there is no short-cut, no way around the difficult task of trying to legislate a better system.

There are a few other lessons that are worth reiterating here, in part because they are simply elements of good public administration and are thus applicable to any program that EPA or OSHA might undertake:

- More advanced planning about the goals and procedures of the programs would have saved a lot of mistakes and delays at later stages;
- Clear goals and simple procedures are major assets of a program and are important incentives for business participation;
- There should be agreed-upon measures to document program accomplishments and progress;
- The lack of program evaluation efforts impedes efforts to draw the correct lessons from a program and leaves it vulnerable to any politically convenient interpretation.



Industries of the Future

The  Industries of the Future strategy creates partnerships between industry, government, and supporting laboratories and institutions to accelerate technology research, development, and deployment. Led by the Office of Industrial Technologies within the Department of Energy's Office of Energy Efficiency and Renewable Energy, the Industries of Future strategy is being implemented in the seven energy- and waste-intensive industries listed below.

These industries use more than 80 percent of the energy consumed in all U.S. manufacturing. Two key elements of the strategy include an industry-driven document outlining the industry's vision for the future and a technology roadmap to outline the technology that will be needed in order to reach their goals. Through this process, government-funded research is brought to a sharp focus to benefit U.S. industry. To the extent that visions and technology roadmaps have been completed, OIT has outlined research needs.

Industries of the Future Overview Briefing

 Aluminum - Works in the refining of alumina to the fabrication of a broad range of products from beverage cans to aircraft and construction materials.

 Chemicals - Produces over 70,000 different products ranging from basic commodity chemicals, such as sulfuric acid and plastics, to mass-marketed consumer goods such as drugs, detergents, and paints.

 Forest Products - Produces wood and paper products for a wide variety of consumer goods, such as stationery and paper tissues, and industrial products, such as cardboard packaging and paper for newsprint.

 Glass - Produces and fabricates a diverse set of products: flat glass, largely used for windows; glass containers, such as for bottles; fiberglass for insulation and structural applications; and specialty glass, such as optical fibers.

 Metalcasting - Melts and casts mostly scrap metal into literally tens of thousands of intricately shaped metal parts that are used in the assembly of over 90% of all durable goods and in virtually 100% of machine tools, manufacturing machinery, and similar capital goods.

 Petroleum - Converts crude oil into fuels and feed stocks used in a wide range of products for transportation, industry, electrical generation, and heating.





Steel - Makes, shapes, and ships steel products, one of the most basic and widely used metals, to many markets such as construction, automotive, and machinery.

Agriculture - New team which is focusing on renewable bioproducts and the food processing industries

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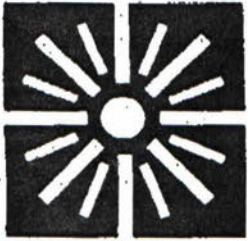


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July 25, 1997

97 JUL 25 PM 9:10

TO: Todd Stern
FR: Dan Carol
RE: Alternative to Carbon Taxes

Greetings from the past. I trust you are doing well.

Saw the good news that you are the global warming guru and wanted to pass on some thinking that's going on that seems very promising -- and might provide an alternative to those pesky carbon tax issues.

Most of what you need should be in the attached e-mail and op-ed. Peter Barnes, who created Working Assets, is the guy to contact for more @ 415-826-8658. Most of this work is going on through Peter's support of the Corporation for Enterprise Development.

Best.

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PeterBarn@aol.com,7/24/97 5:43 PM,Re: Climate Change Op Ed/First Draft**1**

X-POP3-Rcpt: dancarol@chinook
From: PeterBarn@aol.com
Date: Thu, 24 Jul 1997 13:43:32 -0400 (EDT)
To: dan@ctsg.com
Subject: Re: Climate Change Op Ed/First Draft

T
Stern
2/4

I read about the appointment... I guess Clinton is getting serious....

If you know him pretty well, maybe you could send him some stuff outlining the "green dividend" approach. This is a simplified and politically sanitized version of the auction > dividend plan. Basically, it addresses the "big pain, no gain" argument with a real gain: dividends for life, for you and your kids. The dividends, of course, come from auctioning carbon emission rights.

I can't remember whether I forwarded you a copy of the memo I sent to Ray Anderson, the head of the Pres. Council on Sustainable Development. I will attach it again here in case I didn't. Maybe some version of this would be worth sending to Stern. Of course I'd be delighted to meet with him, too....

-Peter

Ray Anderson of the PCSD has said he's been asked by the White House to drum up support for a climate change treaty, with the sole proviso that carbon taxes are an absolute no-no. I responded as below to his query.

By way of introduction, I am a semi-retired businessman, having been in the solar energy business in the 1970s, then a founder and president of Working Assets until two years ago. I was an early member of the Social Venture Network and Businesses for Social Responsibility. More recently I have been a senior fellow at Redefining Progress, and now a visiting scholar at the Corporation for Enterprise Developments, two "think tanks" in San Francisco.

Over the last two years I have been pondering climate change quite a bit ---- both the politics and the economics. One conclusion I've come to is: we need to create an economic benefit from climate change that is directly experienced by the majority of Americans ---- otherwise the "all pain, no gain" argument will prevail.

And what might that economic benefit be? Simply put, it would be "green dividends" for life. Where would those dividends come from? From auctioning carbon emission permits. How much might they be? Greater than the \$500 per child tax credit everyone talks about now.

But let me back up a bit. The White House says carbon taxes are out; some kind of emission permit system is the more acceptable alternative. OK. But do we give the permits away for free, or do we charge for them? These permits will be very valuable ---- more valuable than the broadcast spectrum we recently handed to TV broadcasters for free. (Al Gore knows all about that. Ditto Bob Dole, who called it "corporate welfare" and said the spectrum "belongs to every American equally." William Safire and the Heritage Foundation said the same thing. In other words, on the matter of not giving away the sky, there's political cover on the right.)

So we auction carbon emission permits. Of course they're tradable, and a market develops, and businesses use that market to figure out the most efficient ways to utilize our reduced level of emissions. But the auctions also raise revenue ---- according to some DRI estimates, we could be talking hundreds of billions of dollars annually. That could put a nice dent in the national debt ---- or it could be paid back to citizens in the form of "green

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PeterBarn@aol.com,7/24/97 5:43 PM,Re: Climate Change Op Ed/First Draft**2**

dividends," the way Alaska mails checks of about \$1,000/year to all its citizens (based on oil revenue).

So why not link a climate change program to "green dividends" ---- a check in the mail every year to reward us for good behavior on the environment? It's a lot more appealing than a tax!

Of course, the dividends must come from somewhere, and ultimately we'd pay for them at the pump and the meter, as the cost of emission permits is added to the price of fossil fuels. But so what? Fuel prices are going to rise ANY WAY when carbon emissions are reduced. If we give away the permits for free, the higher prices will flow entirely to fuel companies. Auctions and dividends are a way to recycle the higher prices back to those who pay them. People who consume less fossil fuels will come out ahead ---- which is exactly as it should be. Without auctions and dividends, we'll ALL come out behind (unless we own Exxon).

What's politically neat about this approach is that, though money will flow from permit auctions, Congress won't ever have to vote for a tax. Rather, Congress members can position themselves on the side of the people, opposing the giveaway of public property and favoring the mailing of checks to every American (not just every middle-class kid) every year, as in Alaska.

(Alaskans may have their oil, but ALL Americans have the sky!)

If this interests you, I can send you something more thorough.

Sincerely,

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The New York Times

VIEWPOINT

PETER BARNES

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One Sky, Many Owners

IT'S 1999. To reduce the risk of global warming, the United States and other industrial nations have agreed to cut carbon dioxide emissions by 10 percent in the coming decade.

To make these cuts efficiently, the United States has set up a system of marketable permits for carbon emissions. Every unit of oil, coal and natural gas sold in the United States must have an emission permit attached to it, and the total number of permits will decline over time.

Who receives these permits? What, if anything, do they pay for them? And, most important, if they pay, who gets the money?

This picture is not unlikely and these questions are pressing, as global warming emerges as one of the hottest issues of the end of the 20th century. At stake are literally trillions of dollars in permit costs. And underlying it all is a question of profound importance for the 21st century: Who will own the sky?

Until now, people have battled over land, water, oil and other valuable materials. But there has always been enough sky. That was before the sky became a waste dump for industrial economies. Now it is clear that Chicken Little had it almost right: the sky isn't falling, but it is filling. The gaseous bubble we inhabit can absorb only so much ozone-eating chlorine, acid-brewing sulfur and heat-reflecting carbon dioxide. There is already a permit system for sulfur emissions, and now there is an ever more urgent need to limit carbon emissions.

When the heads of state of the seven largest industrial nations meet next month in Denver, they plan to discuss ways to reduce the risk of global warming. So far, they have agreed to set legally binding targets for carbon dioxide emission reductions. The many nations that will gather this December at the climate-change negotiations in Kyoto, Japan, must still decide what those targets will be, and how those levels will be enforced.

Without yet suggesting specific targets, the United States has proposed an ingenious system to encourage good behavior. Each industrial nation would have its target for carbon dioxide emissions expressed in the form of internationally tradeable emission permits. Countries that reduce emissions below their targets could sell their surplus permits and earn money, or bank them for future years. Countries that exceed their targets can purchase unused permits, if

available, from other countries.

What all this means from a historical perspective is that the era of free sky is over. In the future, there will be an economy of sky. Property rights will be established, prices will be charged, and money will change hands. Lots of money.

DRI/McGraw-Hill, an economic consulting firm, estimates that if the United States stabilizes carbon dioxide emissions at the 1990 level, permits to emit carbon into the sky will cost some \$230 billion in 2010. That is the extra money Americans will pay that year when the demand to burn fossil fuels meets the limited quantity of carbon emission permits then available. If emission ceilings are set below the 1990 level, as most climate scientists say they must be, those permits will be worth even more.

This brings us back to who gets the permits, how much they pay for them and where the money goes — questions that Congress must eventually answer. Energy companies have staked a claim to carbon emission permits based on the historically free use of the sky. But if their claim is granted, the higher prices that they will charge Americans will flow almost entirely to those few corporations, in a giveaway of sky rivaled only by the giveaway of land to railroads in the 19th century.

There are at least two alternatives. One is to have the Federal Government auction off carbon emission permits and pocket the proceeds, much as it does with bits of the broadcast spectrum.

THE second alternative is inspired by the 10th Amendment to the Constitution, which says that what is not explicitly granted to the Federal Government belongs directly to the people.

In this alternative, it is the people, not Uncle Sam, who would own America's share of the global sky. Instead of flowing into the United States Treasury, revenue from periodic auctions of carbon emission permits would flow into a trust fund whose beneficiaries are all current and future citizens. The trust fund would pay dividends to each of these citizen-owners, maybe in cash, but more prudently as matching contributions to restricted individual savings accounts. With such accounts, all Americans could build up savings for higher education, job training, a first home purchase, self-employment and retirement.

The concept here is simple, yet bold: If we must pay to use the sky, we should do so in a way that shifts money from consumption to savings and increases the opportunity for all citizens to achieve the American dream.

Peter Barnes is the head of the Common Assets Project of the Corporation for Enterprise Development in San Francisco, a nonprofit organization.

SUNDAY, MAY 11, 1997